Computer Science Bachelor
General Description of the Department

The Computer Science/Mathematics Department offers programs of study in two different areas:

• Computer Science (Bachelor and Master)
• Information Systems and Management (Bachelor and Master, in cooperation with the Business Administration Department 10)

This brochure only describes the Computer Science Bachelor program of study. There are separate brochures for the Master Degree Program, and for the programs of study in Information Systems and Management.

The following 13 laboratories with about 100 workstations are available to students:

• Laboratory for Chip Cards,
• Laboratory for Computer Anatomy,
• Laboratory for Computer Graphics and Image Processing,
• Laboratory for Autonomous Systems,
• Laboratory for Microcomputers,
• Laboratory for Computer Vision and Pattern Recognition,
• Laboratory for Computer Integrated Manufacturing,
• Laboratory for Computer Organisation,
• Laboratory for Software Development,
• Laboratory for Java,
• Laboratory for Knowledge-Based Systems, and
• Laboratory for e-Commerce.

In addition, two theme-based laboratories do not have their own facilities and hardware but rather share space in the laboratories listed above:

• Laboratory for Database Systems and Information Management,

Bachelor program of Study

Within 7 semesters, students of the newly designed Bachelor program can achieve the

Academic degree: Bachelor of Science (B.Sc.)

The Bachelor degree program was accredited by the ASRIN.

Concurrently to the Bachelor program of study, students may enrol in the supplemental program „Privacy and Data Protection“. Successful graduates of this supplemental program will receive a state-approved university certificate.

Admission requirements

The general requirements for admission to a University of Applied Sciences (Fachhochschule) apply. This means that generally a high school degree or a degree from a polytechnic college is a prerequisite.

In addition, applicants must take an aptitude test whose components may change over time. You may obtain details on the current process from the departmental webpage (www.cs.fhm.edu).

Recommendations for exchange students

The study period at the Munich University of Applied Sciences (MUAS) can be one or more semesters in length. All courses in the Bachelor degree program are one semester in length and conclude with an examination at the end of the semester. Note, however, that not all courses are offered in every semester. Some courses will only be offered in summer semester, others only in winter semester. In each semester, only a choice of the electives will be offered.

Exchange students are free to make a course selection that most complements the course requirements of their home university. When making their choice, it is irrelevant whether the chosen courses are required courses, electives, or whether the courses are from different programs of study or take place in different semesters of study. It is, however, the student’s own responsibility to make sure that there are no scheduling conflicts in the student’s weekly lecture schedule. Such conflicts can generally be avoided by choosing courses that all take place in the same semester of study.

Each semester, a small number of the courses will be offered in English language. However, in order to allow for a useful and flexible selection of courses, it is strongly recommended that exchange students be able to attend courses in german language.

Diagram

Bachelor of Science

Main phase studies

7. Semester (with Bachelor thesis)
6. Semester
5. Semester (practical semester)
4. Semester
3. Semester
2. Semester
1. Semester

Preliminary exam

Basic phase of studies

7. Semester
6. Semester
5. Semester (practical semester)
4. Semester
3. Semester
2. Semester
1. Semester
Examination regulations and grading procedures

In most courses, students will have to pass a written exam at the end of the semester. Others require students to also hand in practicum assignments or research project reports, or to give presentations. Most of these assignments receive a grade. Some are marked on a „pass“ or „fail“ basis.

1.0 is the highest grade and 5.0 the lowest; a grade of 4.0 means you have just passed the exam.

- 1.0 or 1.3 means: very good
- 1.7 or 2.0 or 2.3 means: good
- 2.7 or 3.0 or 3.3 means: satisfactory
- 3.7 or 4.0 means: adequate
- 5.0 means: insufficient (failed)

Students may repeat any failed exam once. A limited number of exams may be repeated twice upon applying to do so.

You will find the binding rules for exams in the current course calendar (Studienplan) as well as in the conditions of study and exam ordinance (Studien- und Prüfungsordnung).

Name: Prof. Dr. Christian Vogt
Responsible for all of the department’s partner universities.

Description of the individual courses in each semester

Abbreviations

- GSCE = General Studies Compulsory Elective
- DCE = Departmental Compulsory Elective
- H/W = Hours per Week

Computer Science - Bachelor

This Bachelor degree program can only be started in the winter semester. First semester courses are only offered in the winter, and second semester courses are only offered in the summer. Courses in the third and higher semesters will be offered in every semester.

Course overview

1 Semester

<table>
<thead>
<tr>
<th>Course no</th>
<th>Title</th>
<th>Type</th>
<th>H/W</th>
<th>Credits</th>
</tr>
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<tbody>
<tr>
<td>IF-I-B01</td>
<td>Analysis</td>
<td>Mandatory</td>
<td>4</td>
<td>5</td>
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<tr>
<td>IF-I-B02</td>
<td>Linear Algebra</td>
<td>Mandatory</td>
<td>4</td>
<td>5</td>
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<tr>
<td>IF-I-B05</td>
<td>IT-Systems I</td>
<td>Mandatory</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>IF-I-B07</td>
<td>Software Development I</td>
<td>Mandatory</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>IF-I-B10</td>
<td>Technical Computer Science</td>
<td>Mandatory</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>IF-I-B11</td>
<td>General Studies Course</td>
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2 Semester

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<thead>
<tr>
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<tr>
<td>IF-I-B03</td>
<td>Discrete Mathematics</td>
<td>Mandatory</td>
<td>4</td>
<td>5</td>
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<tr>
<td>IF-I-B04</td>
<td>Applied Mathematics</td>
<td>Mandatory</td>
<td>4</td>
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<tr>
<td>IF-I-B06</td>
<td>IT Systems II</td>
<td>Mandatory</td>
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<tr>
<td>IF-I-B09</td>
<td>Theoretical Computer Science</td>
<td>Mandatory</td>
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<td>5</td>
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<tr>
<td>IF-I-B11</td>
<td>General Studies Course</td>
<td>GSCE</td>
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3 Semester

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<tr>
<td>IF-I-B12</td>
<td>Software Engineering I</td>
<td>Mandatory</td>
<td>4</td>
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<tr>
<td>IF-I-B14</td>
<td>Computer Networks I</td>
<td>Mandatory</td>
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<td>IF-I-B15</td>
<td>Database Systems I</td>
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<td>IF-I-B16</td>
<td>Algorithms and Data Structures I</td>
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<td>4</td>
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<td>IF-I-B21</td>
<td>Computer Architecture</td>
<td>Mandatory</td>
<td>4</td>
<td>5</td>
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<tr>
<td>IF-I-B24</td>
<td>Integral Transformations</td>
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4 Semester

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<tr>
<td>IF-I-B13</td>
<td>Operating Systems I</td>
<td>Mandatory</td>
<td>4</td>
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<tr>
<td>IF-I-B17</td>
<td>Data Security and Privacy</td>
<td>Mandatory</td>
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<td>IF-I-B18</td>
<td>Software Architecture</td>
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<td>IF-I-B25</td>
<td>Management of IT Projects</td>
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<td>IF-I-B23</td>
<td>Probability Theory and Statistics</td>
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<tbody>
<tr>
<td>IF-I-B39</td>
<td>Practical Study Semester</td>
<td>Mandatory*</td>
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<tr>
<td>IF-I-B40</td>
<td>Course Accompanying the Practical Study Semester</td>
<td>Mandatory*</td>
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* The practical semester may be waived if the job experience can be demonstrated. Applications to do so must be made at the beginning of the program.

### 6 Semester

<table>
<thead>
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<td>IF-I-B20</td>
<td>Distributed Software Systems</td>
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<tr>
<td>IF-I-B22</td>
<td>Computer Graphics and Image Processing</td>
<td>Mandatory</td>
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<td>DCE</td>
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<td>DCE from the Compulsory Immersion Courses Electives Group (2)</td>
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<tr>
<td>IF-I-B37</td>
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### 7 Semester

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<tr>
<td>IF-I-B19</td>
<td>Compiler</td>
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<tr>
<td>IF-I-B38</td>
<td>Bachelor’s Thesis</td>
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### (1) Courses in the Mathematics electives group (*)

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<th>Credits</th>
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<tr>
<td>IF-I-B26</td>
<td>Numerical Analysis</td>
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<tr>
<td>IF-I-B27</td>
<td>Operations Research</td>
<td>DCE</td>
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<tr>
<td>IF-I-B28</td>
<td>Differential Calculus in R and Differential Equations</td>
<td>DCE</td>
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### (2) Courses in the Immersion Courses electives group (*)

<table>
<thead>
<tr>
<th>Course no</th>
<th>Title</th>
<th>Type</th>
<th>H/W</th>
<th>Credits</th>
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<tr>
<td>IF-I-B29</td>
<td>Theoretical Computer Science II</td>
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<tr>
<td>IF-I-B30</td>
<td>Technical Computer Science II</td>
<td>DCE</td>
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<tr>
<td>IF-I-B31</td>
<td>Software Engineering II</td>
<td>DCE</td>
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<td>5</td>
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<tr>
<td>IF-I-B32</td>
<td>Operating Systems II</td>
<td>DCE</td>
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<td>5</td>
</tr>
<tr>
<td>IF-I-B33</td>
<td>Computer Networks II</td>
<td>DCE</td>
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<td>5</td>
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<tr>
<td>IF-I-B34</td>
<td>Database Systems II</td>
<td>DCE</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>IF-I-B35</td>
<td>Algorithms and Data Structures II</td>
<td>DCE</td>
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<td>5</td>
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<tr>
<td>IF-I-B36</td>
<td>Data Security and Privacy II</td>
<td>DCE</td>
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</table>

### „Privacy and Data Protection“ Supplemental Program

<table>
<thead>
<tr>
<th>Course no</th>
<th>Title</th>
<th>H/W</th>
<th>Bemerkungen</th>
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<tbody>
<tr>
<td>IF-Z-BD01</td>
<td>Privacy and Data Protection*</td>
<td>4</td>
<td>Contained in IF-I-B17 and IF-I-B36</td>
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<tr>
<td>IF-Z-BD02</td>
<td>IT Security*</td>
<td>4</td>
<td>Contained in IF-I-B17 and IF-I-B36</td>
</tr>
<tr>
<td>IF-Z-BD03</td>
<td>Business Law</td>
<td>4</td>
<td></td>
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<tr>
<td>IF-Z-BD04</td>
<td>Practical Studies in Privacy and Data Protection</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>IF-Z-BD05</td>
<td>Current Issues in Data Protection</td>
<td>2</td>
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</table>

* The two courses IF-Z-BD01 and IF-Z-BD02 together are equivalent to the two courses IF-I-B17 and IF-I-B36.

Students who have successfully completed the preliminary exam may enrol in the „Privacy and Data Protection“ supplemental program. The program includes the following courses. Some of the courses also are compulsory courses in the Bachelor program of study.
### Course Description

#### 1. Analysis (Calculus)

**Course:** IF-I-B01  
**4 H/W**  
**1 Semester**  
**5 ECTS-Credits**

**Objectives**  
Course description: The basic terminology of analytic conclusions, particularly series, sequences, continuity and differentiability and the integrability of functions are introduced. The most important elemental classes of functions, namely polynomials, rational functions, trigonometric functions, exponential functions, hyperbolic functions and their inverse functions, will be discussed in order to become familiar with calculus techniques. Students will practice solving integration problems by using primitive functions. Through the use of Taylor series, students will see that power series coupled with differential calculus are suitable for solving elementary approximation problems. Furthermore, examples will illustrate that differential and integral calculus form the theoretical basis required to explain the physical and electro-engineering basics of computer science.

<table>
<thead>
<tr>
<th>Prerequisites</th>
<th>none</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Course objective</strong></td>
<td>Introduction to and practice of the most important methods and techniques of differential and integral calculus.</td>
</tr>
<tr>
<td><strong>Recommended literature</strong></td>
<td>E.g. Stewart, „Calculus“</td>
</tr>
<tr>
<td><strong>Method of instruction</strong></td>
<td>Seminars</td>
</tr>
<tr>
<td><strong>Examination</strong></td>
<td>written exam</td>
</tr>
<tr>
<td><strong>Language of instruction</strong></td>
<td>german</td>
</tr>
<tr>
<td><strong>Name of lecturer</strong></td>
<td>Eich-Soellner, Plöchinger, Recknagel</td>
</tr>
</tbody>
</table>

#### 2. Linear Algebra

**Course:** IF-I-B02  
**4 H/W**  
**1 Semester**  
**5 ECTS-Credits**

**Objectives**  
The standard topics of linear algebra (linear transformations, linear systems of equations, scalar products, determinants, eigenvalues) will be discussed. Due to the limited number of instruction hours, these topics are presented in a simplified format.

<table>
<thead>
<tr>
<th>Prerequisites</th>
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</thead>
<tbody>
<tr>
<td><strong>Course objective</strong></td>
<td>Students should know the most important terminology and findings of linear algebra.</td>
</tr>
<tr>
<td><strong>Method of instruction</strong></td>
<td>Seminars</td>
</tr>
<tr>
<td><strong>Examination</strong></td>
<td>written exam</td>
</tr>
<tr>
<td><strong>Language of instruction</strong></td>
<td>german</td>
</tr>
<tr>
<td><strong>Name of lecturer</strong></td>
<td>Hörwick</td>
</tr>
</tbody>
</table>

#### 3. Discrete Mathematics

**Course:** IF-I-B03  
**4 H/W**  
**2 Semester**  
**5 ECTS-Credits**

**Objectives**  
Numbers theory: induction, largest common factors, prime numbers, Chinese remainder theory.  
Graph theory: graphs, trees, search and sort algorithms.  
Combinatorics: combinatorial calculation of probabilities.

<table>
<thead>
<tr>
<th>Prerequisites</th>
<th>none</th>
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<tbody>
<tr>
<td><strong>Course objective</strong></td>
<td>Students are introduced to numbers theory, graph theory and combinatorics</td>
</tr>
<tr>
<td><strong>Method of instruction</strong></td>
<td>Seminars</td>
</tr>
<tr>
<td><strong>Examination</strong></td>
<td>written exam</td>
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<tr>
<td><strong>Language of instruction</strong></td>
<td>german</td>
</tr>
<tr>
<td><strong>Name of lecturer</strong></td>
<td>Hörwick, Recknagel</td>
</tr>
</tbody>
</table>

#### 4. Applied Mathematics

**Course:** IF-I-B04  
**4 H/W**  
**2 Semester**  
**5 ECTS-Credits**

**Objectives**  
The course has two goals: Solving a problem of medium difficulty with mathematical modelling and using computer science tools will be demonstrated. The mathematical model precedes its own implementation or the application of mathematics software. The economic gains of applying mathematical methodology will be shown. Students will learn how to work in teams and make presentations. Examples:

(a) treatment of themes from OR, optimisation, graph theory and similar problems and implementation of solutions by the students.  
(b) treatment of mathematical themes taking computer algebra systems into account.

<table>
<thead>
<tr>
<th>Prerequisites</th>
<th>Analysis, Linear Algebra modules</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Course objective</strong></td>
<td>An understanding of computer algebra systems, development of mathematical models and their implementation, working in teams.</td>
</tr>
<tr>
<td><strong>Recommended literature</strong></td>
<td>E.g. Stephen Wolfram „Mathematica-Handbook“</td>
</tr>
<tr>
<td><strong>Method of instruction</strong></td>
<td>presentation and seminar work</td>
</tr>
<tr>
<td><strong>Examination</strong></td>
<td>written exam</td>
</tr>
<tr>
<td><strong>Language of instruction</strong></td>
<td>german</td>
</tr>
<tr>
<td><strong>Name of lecturer</strong></td>
<td>Eich-Soellner, Gruber</td>
</tr>
</tbody>
</table>

#### 5. IT-Systems I

**Course:** IF-I-B05  
**4 H/W**  
**1 Semester**  
**5 ECTS-Credits**

**Objectives**  
Lectures will cover the common characteristics of modern IT systems:  
• Information representation and coding  
• Principles of the classic John von Neumann computer  
• Control  
• Principles of machine-level programming  
• Basic data structures.  
Machine-level programming will be practiced during the practicum with the simulated MMIX model computer of Donald E Knuth.

<table>
<thead>
<tr>
<th>Prerequisites</th>
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<tbody>
<tr>
<td><strong>Course objective</strong></td>
<td>The composition and functioning of an IT system from the register level to the operating system will be explained. Students will become familiar with the interface between hardware and software.</td>
</tr>
<tr>
<td><strong>Recommended literature</strong></td>
<td>Anlauf, Böttcher, Ruckert: „Das MMIX-Buch“, Springer 2002</td>
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<tr>
<td><strong>Method of instruction</strong></td>
<td>presentation and seminar work</td>
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<tr>
<td><strong>Examination</strong></td>
<td>written exam</td>
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<tr>
<td><strong>Language of instruction</strong></td>
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</tr>
<tr>
<td><strong>Name of lecturer</strong></td>
<td>Anlauf, Böttcher, Ruckert</td>
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</table>
6. IT-Systems II
Course: IF-I-B06
4 H/W
2. Semester
5 ECTS-Credits
Objectives
Machine-level programming:
• Structure of programmes and data
• Interface to the operating system
Handling modern operating systems:
• Introduction to Linux
• Practical exercises with Linux

Prerequisites
IF-I-B06: IT Systems I
Course objective
Building on IT Systems I, complex processes at the machine level will be discussed. IT Systems II covers operating systems basics and provides an overview of the essential characteristics. In the practicum, students will learn how to use modern operating systems.

Recommended literature
Anlauf, Böttcher, Ruckert: „Das MMIX-Buch“, Springer 2002
Method of instruction
seminars and a practicum
Examination
written exam
Language of instruction
german or english
Name of lecturer
Anlauf, Böttcher, Ruckert

7. Software Development I
Course: IF-I-B07
6 H/W
1. Semester
8 ECTS-Credits
Objectives
Basic concepts of procedural and object-oriented programming based on current and generally available programming languages. The most important topics covered are algorithms, data encapsulation, and inheritance.

Prerequisites
none
Course objective
The ability to develop systematic and efficient software for solving simple problems.

Recommended literature
R. Schiedermeier: Programmieren mit Java, Pearson Studium 2005
Method of instruction
seminars with practical exercises
Examination
written exam
Language of instruction
german or english
Name of lecturer
Böttcher, Köhler, Möncke, Pleier, Schiedermeier

8. Software Development II
Course: IF-I-B08
6 H/W
2. Semester
8 ECTS-Credits
Objectives
On the one hand, this course teaches advanced programming concepts, e.g. recursion, evaluating the complexity of algorithms and concurrency. On the other hand, practical aspects will be addressed such as input and output, network programming, the definition and use of data structure containers, use of class libraries, tests and dealing with errors.

Prerequisites
none
Course objective
Coming up with solutions to problems of medium difficulty through use of the appropriate programming methods and libraries.

Recommended literature
R. Schiedermeier: Programmieren mit Java, Pearson Studium 2005
Method of instruction
seminars with practical exercises
Examination
oral exam
Language of instruction
german or english
Name of lecturer
Böttcher, Köhler, Möncke, Pleier, Schiedermeier

9. Theoretical Computer Science I
Course: IF-I-B09
4 H/W
2. Semester
5 ECTS-Credits
Objectives
This course introduces the methods and findings of significant areas in theoretical computer science which are applied to many other areas in computer science. This includes:
• Automata theory
• Formal languages
• Complexity and computability theory

Prerequisites
none
Course objective
Knowledge of important theories and methods of theoretical computer science which are applied in many areas of computer science.

Recommended literature
Method of instruction
seminars
Examination
written exam
Language of instruction
german or english
Name of lecturer
Motsch, Nischwitz, Vogt

10. Technical Science I
Course: IF-I-B10
4 H/W
1. Semester
5 ECTS-Credits
Objectives
This course discusses techniques derived from the most important logic families. Students are introduced to Boolean algebra, the technical assembly of digital elementary logic gates and the principles of impulse and digital technology. Building on that, methods for the design and analysis of simple digital components are explained. This allows students to be able to design the basic elements of logical, arithmetic or storage entities in computer systems and understand how they work.

Prerequisites
none
Course objective
An understanding of the assembly of digital elements and the design and behaviour of combinatorial and sequential circuits.

Recommended literature
Tietze, Schenk: Halbleiterbauelemente Springer Ernst: Grundlagen und Konzepte der Informatik
Method of instruction
seminars with theoretical and practical exercises
Examination
written exam
Language of instruction
german
Name of lecturer
Marke, Motsch, Nischwitz, Vogt
11. General Studies Courses

Course: IF-I-B11

4 ECTS-Credits

Objectives
- The compulsory electives from the General Studies department may be freely selected from the department's course catalogue.
- The total number of ECTS credits must conform to the number of ECTS credits stated in the lecture schedule.

Prerequisites
- none

Course objective
- The acquisition of character-building general knowledge.

Method of instruction
- seminars

Examination
- determined by the General Studies department

Language of instruction
- German or English

12. Software Engineering I

Course: IF-I-B12

5 ECTS-Credits

Objectives
- Objectives of software engineering: 
  - Basic terminologies and concepts, network topologies and network classes
  - Foundations of communication engineering
  - Forms of communication
  - Norms and specifications
  - Setup of networks, active and passive network components
  - Introduction to network security
  - Layered architecture and protocols
  - TCP/IP Internet application, protocols

Course Objective
- Knowledge of the fundamental internal functions of an operating system required to assess and select an operating system, write high-performance applications, as well as operate an IT system.

Method of Instruction
- Seminars with practical and theoretical exercises

Examination
- Written exam, practical proof of achievement (practicum work or presentation)

Language of Instruction
- German or English

Name of Lecturer
- Vogt, Schnörr

13. Operating Systems I

Course: IF-I-B13

5 ECTS-Credits

Objectives
- This course covers the tasks of an operating system as well as basic concepts pertaining to their execution and examples of the implementation in important, current operating systems. Topics covered include:

- Processes and threads
- Interrupts
- Scheduling
- Synchronisation methods
- Memory management
- File systems and input and output systems

Prerequisites
- IF-I-B05: IT Systems I, IF-I-B06: IT Systems II
- IF-I-B21: Computer Architecture

Course Objective
- Knowledge of the fundamental internal functions of an operating system required to assess and select an operating system, write high-performance applications, as well as operate an IT system.

Recommended Literature
- Silberschatz et al., Operating System Concepts, 5th Edition
- Stallings, Operating Systems, Prentice Hall
- Tanenbaum, Modern Operating Systems, Prentice Hall
- Tanenbaum, Modern Operating Systems, Prentice Hall
- Tanenbaum, Modern Operating Systems, Prentice Hall

Method of Instruction
- Seminars

Examination
- Written exam

Language of Instruction
- German or English

Name of Lecturer
- Vogt, Schnörr

14. Computer Networks I

Course: IF-I-B14

5 ECTS-Credits

Objectives
- Basic terminologies and concepts, network topologies and network classes
- Foundations of communication engineering
- Forms of communication
- Norms and specifications
- Setup of networks, active and passive network components
- Introduction to network security
- Foundations of network management
- Selected topics and recent developments

Prerequisites
- IF-I-B05: IT Systems I, IF-I-B06: IT Systems II
- IF-I-B21: Computer Architecture

Course Objective
- Introduction to the terminology and principles of network technology and protocols. Knowledge of the principles and applications of data communications.

Recommended Literature
- Stein, E.: Rechnernetze und Internet, Fachbuchverlag Leipzig
- Olbricht, A.: Netzwerkprotokolle Spezifikationen, Vieweg

Method of Instruction
- Seminars with practical and theoretical exercises

Examination
- Written exam, practical proof of achievement (practicum work or presentation)

Language of Instruction
- German or English

Name of Lecturer
- Marke, Peter, Böttcher, Mandi, Kirch-Prinz
### 15. Database Systems I
**Course:** IF-I-B15  
4 H/W  
3. Semester  
5 ECTS-Credits

**Objectives**
Seminars will cover:
- Foundations of database systems and architecture
- Database management systems, focussing on relational databases
- Database languages, particularly SQL
- Physical database organization
- Transaction and concurrency concepts, recovery methods
- Administration of database systems, access control aspects
- Database special topics

**Prerequisites**
none

**Course objective**
overview of architectures, processes and applications of database systems, knowledge of the most significant methods, techniques, processes and tools used with persistent data.

**Recommended literature**
- Perml, G.; Unland, R.: Datenbanken im Unternehmen, Oldenbourg, 2001

**Method of instruction**
seminars with a practicum

**Examination**
written exam

**Language of instruction**
german

**Name of lecturer**
Schwenkert, Staudt

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### 16. Algorithms and Data Structures I
**Course:** IF-I-B16  
4 H/W  
3. Semester  
5 ECTS-Credits

**Objectives**
This course covers abstract linear and hierarchical data types, the complexity of their operations, the choices of implementation, and their use in applications. In particular, this includes:
- Linear data structures (e.g. linear lists, sorted lists, constrained linear structures)
- Hierarchical data structures (e.g. k-ary trees, binary search trees, heaps, binary trees) along with their common operations (e.g. generating, inserting, deleting and searching) and applications.

**Prerequisites**
none

**Course objective**
The ability to assess the suitability of data structures and algorithms and the capability to implement them. The lab sessions will enable the students to competently apply object-oriented development methods and to use standard libraries.

**Recommended literature**
- one of the standard works on algorithms and data structures, e.g.:
  - Nikolaus Wirth, Algorithmen und Datenstrukturen, Teubner Verlag
  - Sedgewick, Algorithmen in C++, Addison-Wesley Longman

**Method of instruction**
seminars with a practicum

**Examination**
written exam

**Language of instruction**
german or english

**Name of lecturer**
Kirch-Prinz, Köhler

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### 17. Privacy and IT Security I
**Course:** IF-I-B17  
4 H/W  
4. Semester  
5 ECTS-Credits

**Objectives**
Societal and legal principles of privacy and data protection, Foundations of constitutional and European law, Legal and technical terminology, Threats in the areas of communication and information, Current issues in administration and the economy, Legal regulations in the public and private sectors as well as professional secrecy, Organisational and technical aspects of privacy and IT-security, Theoretical security models, risk assessment, Foundations of encryption systems

**Prerequisites**
none

**Course objective**
Insight into dangers and risks of data tempering, knowledge of the legal system of privacy, basic terminology of encryption.

**Recommended literature**
Tinnefeld/Ehmann/Gerling, Einführung in das Datenschutzrecht, Oldenbourg, München  
IT-Grundschutz-Handbuch, BSI

**Method of instruction**
seminars

**Examination**
written exam, 90 minutes

**Language of instruction**
german

**Name of lecturer**
Petri, Gerling, Schuster

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### 18. Software Architecture
**Course:** IF-I-B18  
4 H/W  
after the preliminary exam  
5 ECTS-Credits

**Objectives**
This course covers the design and implementation of complex software systems for server applications. Both conceptual questions such as the design pattern, the OSI model, logic, presentation and the role of application servers as well as the technical aspects such as security, database connectivity, dynamic websites, J2EE and .NET are covered.

**Prerequisites**
Software development I und II (IF-I-B07 und IF-I-B08)

**Course objective**
The ability to design, implement and operate new server applications.

**Method of instruction**
seminars with practical exercises

**Examination**
written exam, term work

**Language of instruction**
german or english

**Name of lecturer**
Böttcher, Schiedermeier
19. Compiler

Course: IF-I-B19
4 H/W
7. Semester
5 ECTS-Credits

Objectives
Overview of compiler phases
Lexical analysis
• Regular expressions
• Non-deterministic finite automata
• Deterministic finite automata
• Use of (F)lex
Syntax analysis
• Formal languages, grammar and derivatives
• Construction of top down parsers (LL parsers)
• First and follow loads
• Construction of bottom up parsers (LR parsers)
Semantic analysis
• Attributes and semantic actions
• S- and L-attributed grammars
• Static type testing
• Implementation of Bison (Yacc)
Generation of MIDDLEWARE
• 3 address code
• translation of expressions
• translation of control structures
• procedure invocations, stack frames, bonding semantics
Optimisation
• optimisation techniques
Code generation
Non-standard applications, e.g. in bioinformatics or linguistics

Prerequisites
Successful completion of Theoretical Computer Science I, Software Development I and II, Algorithms and Data Structures
Course objective
Knowledge of and ability to implement generating tools.
Recommended literature
Method of instruction
seminars with practical exercises
Examination
written exam
Language of instruction
german
Name of lecturer
Schiedermeier, Ruckert, Möncke

20. Distributed Software Systems

Course: IF-I-B20
4 H/W
6. Semester
5 ECTS-Credits

Objectives
Topics include:
• Motivation and foundations,
• Hardware and software architecture principles
• Principles and techniques of processes and threads as well as synchronisation and communication
• Programming network-, library-, high level language-, web-oriented
• Software engineering
• Security
• Particular forms of distributed software systems

Prerequisites
basic phase of computer science programme of studies
Course objective
Knowledge of the foundation, principles, techniques of distributed software systems as architectures, programming, software design, software engineering, security, particular forms.
Recommended literature
of the standard works on distributed systems, e.g.:
Michael Weber: Verteilte Systeme, Spektrum
A. Tanenbaum, M. Steen: Verteilte Systeme - Grundlagen und Paradigmen, Pearson Studium
G. Bengel: Verteilte Systeme, Vieweg
Method of instruction
seminars with practical exercises
Examination
written exam
Language of instruction
german
Name of lecturer
Pleier

21. Computer Architecture

Course: IF-I-B21
4 H/W
3. Semester
5 ECTS-Credits

Objectives
This course covers the principles and methods of analysis, implementation, assessment and classification of computer architectures. The core is made up of discussing architecture principles and characteristics of modern RISC and CISC (micro-)processors as instruction sets, superscalar architecture, pipelining, and cache organisation. Also discussed are the organising principles of multi-processor systems and important architecture models such as SMP systems or large-scale parallel systems by means of real-life examples.

Prerequisites
Course objective
Insight in the assembly and structures of current (micro-)processors and computer systems knowledge indispensable to the design of compilers and development of operating systems.
Recommended literature
Method of instruction
seminars with practical exercises
Examination
written exam
Language of instruction
german or english
Name of lecturer
Böttcher, Motlach
22. Computer Graphics and Image Processing

**Objectives**

This course covers the application of and interrelationship between computer graphics and image processing.

- Computer graphics:
  - The rendering pipeline
  - Geometric modelling
  - Coordination systems and transformations
  - Lighting and shading
  - Texture mapping

- Image processing:
  - Digitisation and sampling theorem
  - Gray scale and color images (color theory), image sequences
  - Point operations (scaling, multi-thresholding, histogram algorithms)
  - Filters in the spatial and frequency domain
  - Feature extraction
  - Image segmentation and classification

**Course: IF-I-B22**

- **4 H/W**
- **6. Semester**
- **5 ECTS-Credits**

**Prerequisites**

- recommended: Integral transformations (IF-I-B24)

**Course objective**

An understanding of the fundamental processes of computer graphics and image processing.

**Recommended literature**

A. Nischwitz, P. Haberäcker: Masterkurs Computergrafik und Bildverarbeitung, Vieweg 2004

**Method of instruction**

seminars with practical exercises

**Examination**

written exam; practical proof of accomplishment (practicum work or presentation)

**Language of instruction**

german or english

**Name of lecturer**

Nischwitz, M. Fischer

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23. Probability Theory and Statistics

**Objectives**

This course will focus on random variables and probability distributions. These terms will be explored on the basis of the realm of mathematical probability. The course will discuss binomial, Poisson, normal, student, Fisher and hyper-geometric distributions as representative of discrete and continuous distributions. These distributions and their use for the testing of hypotheses are covered. In addition, the foundations of Parameter estimation and correlation analysis are taught.

**Course: IF-I-B23**

- **4 H/W**
- **4. Semester**
- **5 ECTS-Credits**

**Prerequisites**

- none

**Course objective**

The objective of this course is to impart an overview of statistics and stochastic processes.

**Method of instruction**

seminars

**Examination**

written exam

**Language of instruction**

german or english

**Name of lecturer**

Hörwick, Zielke

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24. Integral Transformations

**Objectives**

In this course the foundations of Fourier-, Laplace-, and the Z-transformations are taught. With the help of these transformations linear differential calculus problems as well as certain common and partial differential equations are solved. The course also provides an overview of Walsh-, Wavelet- and Radon transformations. These transformations are required for special applications such as computer tomography tomography.

**Course: IF-I-B24**

- **4 H/W**
- **3. Semester**
- **5 ECTS-Credits**

**Prerequisites**

- Linear Algebra and Analysis modules

**Course objective**

Students will gain knowledge of the most important functional transformations and apply them to different areas such as:

- Analysis of linear systems
- Control and feedback control systems
- Image processing
- Data compression
- Signal processing
- Analysis of time series
- Spectral representation of stochastic processes.

**Recommended literature**

D. Müller-Wichards: Transformationen und Signale. Teubner
M. Lazar, M. Maas, R. Rieder: Wavelets. Teubner
R. Brigola: Fourieranalyse, Distributionen und Anwendungen. Vieweg

**Method of instruction**

seminars with exercises

**Examination**

written exam

**Language of instruction**

german or english

**Name of lecturer**

Plöchinger, Zielke

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25. Management of IT Projects

**Objectives**

This course introduces students to basic management principles (e.g. in such areas as labour law, types of enterprise, organisation). In addition, skills required for the execution of projects are taught (e.g. accounting, investment, financing, and marketing). Also covered are aspects of IT project management (e.g. project planning, implementation, organisation, controlling; preliminary survey, cost effectiveness study).

**Course: IF-I-B25**

- **4 H/W**
- **4. Semester**
- **5 ECTS-Credits**

**Prerequisites**

- none

**Course objective**

Acquisition of essential managerial knowledge and skills in IT project management.

**Method of instruction**

seminars and a practicum

**Examination**

written exam

**Language of instruction**

german or english

**Name of lecturer**

N.N.
### 26. Numerical Analysis

**Course:** IF-I-B26  
**Credits:** 4 H/W  
**Semester:** 6  
**ECTS-Credits:** 5

**Objectives**
- Introduction to scientific computing, e.g. Matlab or Scilab
- Error analysis, stability of algorithms
- Solving linear systems of equations (quadratic and over-determined)
- Solving non-linear systems of equations
- Interpolation and approximation
- Numerical differentiation and integration
- Numerical solution of ordinary differential equations
- Fast Fourier-Transformation

**Prerequisites**
Calculus, Linear Algebra (matrix calculations, Gaussian elimination)

**Course objective**
The objective of this course is to introduce the student to the design and analysis of methods and algorithms for solving mathematical problems in science and engineering. In addition, students will be introduced to a scientific computing environment, such as Scilab or Matlab.

- Knowledge and classification of the most important problems and solutions
- Reasonable understanding of state-of-the-art methods and how to proceed from there
- Knowing and understanding the underlying theory
- The ability to find, apply and adapt methods to problems

**Recommended literature**
e.g. M. Heath „Introduction to Scientific Computing“

**Method of instruction**
seminars

**Examination**
written exam

**Language of instruction**
german or english

**Name of lecturer**
Eich-Soellner, Plöchinger

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### 27. Operations Research

**Course:** IF-I-B27  
**Credits:** 4 H/W  
**Semester:** 6  
**ECTS-Credits:** 5

**Objectives**
Classic optimisation (one- and multidimensional, with and without constraints); linear programming (geometry, theorem of Danzig, simplex method, duality, transport and allocation problems); non-linear optimisation (production programme planning, convex and separate optimisation); decision trees (branch and bound); dynamic programming; queuing theory (stochastic processes, Poisson process, queueing models, single and multi-switch systems); network analysis (CPM)

**Prerequisites**
Analysis, Linear Algebra (Gaussian elimination)

**Course objective**
Ability to model optimisation problems; ability to classify the problem; select an appropriate solution method and solve smaller problems by hand.

**Recommended literature**
e.g. Domshke/Drexel „Einführung in Operations Research“

**Method of instruction**
seminars

**Examination**
written exam

**Language of instruction**
german or english

**Name of lecturer**
Eich-Soellner, Plöchinger, Recknagel

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### 28. Differential Calculus in R^n and Differential Equations

**Course:** IF-I-B28  
**Credits:** 4 H/W  
**Semester:** 6  
**ECTS-Credits:** 5

**Objectives**
This course covers real functions with several variables. Fundamental concepts such as:
- Partial derivation, gradient, direction derivative, tangent plane, Jacobian and Hessian
- Chain rules, the Schwarz theorem, Taylor series, linearization, necessary and sufficient conditions for extrema and saddle points.

In addition, the course covers various representations of plane curves. Also discussed are ordinary differential equations (ODEs): general and particular solutions (initial value problem) to first order ODEs (separable and linear); several types of second order ODEs, in particular the general wave equation; insight into the theory of linear systems of ODEs.

**Prerequisites**
Linear Algebra and Calculus in R^n

**Course objective**
Knowledge of the principles of calculus with several variables. This is the prerequisite of an understanding of many areas such as statistics, numerical analysis and operations research.

**Recommended literature**
Mayberg, Vachenauer: Höhere Mathematik 1 und 2. Springer  
John C. Hart: Differential Calculus, J. Wiley and Sons

**Method of instruction**
seminars with exercises

**Examination**
written exam

**Language of instruction**
german or english

**Name of lecturer**
Plöchinger, Recknagel

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### 29. Theoretical Computer Science II

**Course:** IF-I-B29  
**Credits:** 4 H/W  
**Semester:** 6 or 7  
**ECTS-Credits:** 5

**Objectives**
This course covers selected topics from theoretical computer science. The precise topics will be announced well before the beginning of course.

**Prerequisites**
IF-I-B09: Computer Science Theory I

**Course objective**
Enriched knowledge of selected topics from theoretical computer science

**Recommended literature**
be announced depending on the precise topics covered.

**Method of instruction**
seminars

**Examination**
oral exam

**Language of instruction**
german

**Name of lecturer**
Vogt
### 30. Technical Computer Science II

**Course:** IF-I-B30  
**4 H/W**  
**6. or 7. Semester**  
**5 ECTS-Credits**

**Objectives**  
This course covers the physical principles underlying computer science engineering, in other words electromagnetism, solid state physics, semiconductor physics, optoelectronics, as well as the structure and modes of operation of electronic devices (diodes, transistors, etc). This is followed by a discussion of the assembly of logical gates from electronic devices. The course complements the physics foundations in Computer Science for Engineering I which started at the gate level.  
The course may optionally cover developments in quantum computing.

**Prerequisites**  
Basic phase of studies/preliminary exam.

**Course objective**  
an understanding of the physics principles underlying computer science engineering.

**Recommended literature**  
Tietze, Schenk: Halbleiterbauelemente, Springer
Schiffmann, Schmitz: Technische Informatik, Band I, Springer

**Method of instruction**  
seminars with theoretical and practical exercises

**Examination**  
oral exam

**Language of instruction**  
german or english

**Name of lecturer**  
Marke, Motsch, Nischwitz

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### 31. Software Engineering II

**Course:** IF-I-B31  
**4 H/W**  
**6. or 7. Semester**  
**5 ECTS-Credits**

**Objectives**  
Enrichment in the fields:

- Verification and testing  
- CASE tools  
- Development of real-time systems  
- Quality control  
- Configuration management  
- Middleware and client-server systems

**Prerequisites**  
Software Engineering I

**Course objective**  
General overview, acquiring practical experience through examples

**Recommended literature**  
same as for Software Engineering I as well as literatu- 
re from magazines and books relevant to focus.

**Method of instruction**  
seminars with practical experience

**Examination**  
oral exam

**Language of instruction**  
german

**Name of lecturer**  
Streng, Müncke

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### 32. Operating Systems II

**Course:** IF-I-B32  
**4 H/W**  
**6. or 7. Semester**  
**5 ECTS-Credits**

**Objectives**  
This course covers selected topics pertaining to current operating systems issues. The precise topics will be announced well before the beginning of the course.

**Prerequisites**  
IF-I-B013: Operating Systems I

**Course objective**  
An understanding of network engineering and pro- 
ces. Enriched understanding of protocols as well as security problems. Ability to plan, analyse and operate computer networks.

**Recommended literature**  
Tannenbaum: Computernetzwerke, Prentice Hall
Stein: Rechnernetze und Internet, Fachbuchverlag Leipzig, Hanser
TCP/IP-Grundlagen, Lienemann, Heise

**Method of instruction**  
seminars

**Examination**  
oral exam

**Language of instruction**  
german or english

**Name of lecturer**  
Voigt

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### 33. Computer Networks II

**Course:** IF-I-B33  
**4 H/W**  
**6. or 7. Semester**  
**5 ECTS-Credits**

**Objectives**  
Expansion on topics from Networks I. Planning and operation of computer net- 
works, network security and network management including network diagnosis 
and the tools that requires. Treatment of current issues and a view toward future trends.

**Prerequisites**  
Networks I (IF-I-B34)

**Course objective**  
An understanding of network engineering and pro- 
ces. Enriched understanding of protocols as well as security problems. Ability to plan, analyse and operate computer networks.

**Recommended literature**  
Tannenbaum: Computernetzwerke, Prentice Hall
Stein: Rechnernetze und Internet, Fachbuchverlag Leipzig, Hanser
TCP/IP-Grundlagen, Lienemann, Heise

**Method of instruction**  
seminars

**Examination**  
oral exam

**Language of instruction**  
german or english

**Name of lecturer**  
Marke, Pieter, Mandl, Kirch-Prinz

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### 34. Database Systems II

**Course:** IF-I-B34  
**4 H/W**  
**6. or 7. Semester**  
**5 ECTS-Credits**

**Objectives**  
The practical part of this course expands on the student’s knowledge of appli- 
cation development (among others Views, ESQL and Stored Procedures). It also 
 covers the essential aspects of implementing database systems leading to a 
greater understanding of the user point of view. Elements of relational algebra 
and query optimization, physical database organization, coordination of multip- 
le users as well as aspects of data security and protection are introduced. The 
course concludes with a view towards post-relational database systems.

**Prerequisites**  
Database Systems I (IF-I-B15)

**Course objective**  
Enhancing the knowledge on theoretical foundations of database systems, a deeper knowledge in the area of implementing database systems in practice.

**Method of instruction**  
seminars with a practicum

**Examination**  
oral exam

**Language of instruction**  
german

**Name of lecturer**  
Schwenkert, Sauter
35. Algorithms and Data Structures II

Course: IF-I-B35
4 H/W
6. or 7. Semester
5 ECTS-Credits

Objectives
This course covers data types representing graphs and data structures used for external storage media. Its focus is on the complexity of related algorithms, implementation choices, and applications. Specifically, topics include:

- Graph data structures (e.g. multigraphs, digraphs, graphs)
- Hash techniques (e.g. static hashing, adaptive hashing)
- Index structures (e.g. primary and secondary indices, cluster indices, and multi-level indices)

Prerequisites
IF-I-B16 Algorithms and Data Structures I

Course objective
Knowledge of standard methods and techniques to solve common problems in graph theory and in the organisation of external data structures. Capability to find solutions and implement them. The lab sessions will foster the use of object-oriented development methods.

Recommended literature
one of the standard works on algorithms and data structures, e.g.:
R.H. Güting, S. Dieker: Datenstrukturen und Algorithmen, Teubner Verlag
Elmasri, Navathe: Fundamentals of Database Systems, Addison-Wesley
Gio Wiederhold: Dateiorganisation in Datenbanken, McGraw-Hill

Method of instruction
seminars with a practicum

Examination
oral exam

Language of instruction
german or english

Name of lecturer
Kirch-Prinz, Köhler

36. Privacy and IT Security II

Course: IF-I-B36
4 H/W
6. or 7. Semester
5 ECTS-Credits

Objectives
Security considerations of operating systems. Modes of operation, technical implementation and corporate management of security measures (implementation of encryption methods, firewalls, authorisation concepts, etc.). Special topics in data protection. Case studies on selected topics.

Prerequisites
privacy and IT security II (IF-I-B17)

Course objective
Enriched knowledge of the organisational and technical aspects of IT security and in special topics of data protection, ability to address privacy concerns in a practical manner.

Recommended literature
Tinnefeld/Ehmann/Geising: Einführung in das Datenschutzrecht, Oldenbourg, München
BSI-Grundschutzhandbuch

Method of instruction
seminars

Examination
written exam

Language of instruction
german or english

Name of lecturer
Beier, Ehmann, Gerling, Schuster

37. Departmental Compulsory Electives

Course: IF-I-B37
4 each H/W
as of the 4th semester
5 each ECTS-Credits

Objectives
A number of departmental compulsory electives are offered each semester from which students may choose freely
- The total number of ECTS credits must at least total the amount of ECTS credits listed in the lecture schedule

Prerequisites
none

Course objective
acquisition of technical knowledge in specialised areas of computer science

Recommended literature
depends on the topic

Method of instruction
seminars

Examination
written exam

Language of instruction
german or english

38. Bachelor Thesis

Course: IF-I-B38
7. Semester
15 ECTS-Credits

Objectives
Independent development of a solution for a practice-oriented problem using a scientific and methodical approach.

Prerequisites
computer science knowledge comparable to 6 semesters

Course objective
a thesis

Recommended literature
books which will introduce the student to scientific work

Method of instruction
independent study (with direction and supervision)

Examination
Bachelor's thesis

Language of instruction
german or english

Name of lecturer
all

39. Practical Study Semester

Course: IF-I-B39
5. Semester
25 ECTS-Credits

Objectives
Collaboration in selected fields of computer science:
- Software development (e.g. analysis, design, programming, testing)
- Project management or implementation

Prerequisites
all courses of the basic phase of studies

Course objective
Educational objectives: Knowledge of operational processes in the field of computer science by working hands-on as a prospective computer scientist. Encouragement of the collaboration between the university and industry by maintaining contact with companies providing vocational training.

Method of instruction
vocational training at the company

Examination
practicum report and transcript

Language of instruction
german
### 40. Course Accompanying the Practical Study Semester

**Course: IF-I-B40**

**4 H/W**

during the practical study semester (5. Semester)

**5 ECTS-Credits**

<table>
<thead>
<tr>
<th>Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>This course is made up of seminars and immersion in the field relevant to the practicum.</td>
</tr>
<tr>
<td>During the seminars, students give short presentations on their practical work and moderate the discussion that follows.</td>
</tr>
<tr>
<td>A project in hardware or low level programming is included in the supplementary practical concentration area.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>none</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>The seminars aim to enrich the experience gained during the practicum as well as to instil self-confidence in that experience. In addition to solving problems related to the project and its implementation, immersion in the field relevant to the practicum promotes leadership and teamwork skills.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Recommended Literature</th>
</tr>
</thead>
<tbody>
<tr>
<td>to-date literature will be announced during the course.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Method of Instruction</th>
</tr>
</thead>
<tbody>
<tr>
<td>seminars with a practicum</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Examination</th>
</tr>
</thead>
<tbody>
<tr>
<td>colloquium</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Language of Instruction</th>
</tr>
</thead>
<tbody>
<tr>
<td>german or english</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name of Lecturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kirch-Prinz, Schiedermeier, Abmayer</td>
</tr>
</tbody>
</table>

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### Supplemental program „Privacy an Data Protection“

#### 1. Privacy and Data Protection

**Course: IF-Z-BD01**

**4 H/W**

**5 ECTS-Credits**

<table>
<thead>
<tr>
<th>Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Societal and legal principles of privacy and data protection</td>
</tr>
<tr>
<td>• legal and technical terminology</td>
</tr>
<tr>
<td>• the line between data security and privacy</td>
</tr>
<tr>
<td>• balancing the mandates of privacy and data security</td>
</tr>
<tr>
<td>• Threats in the areas of communication and information</td>
</tr>
<tr>
<td>• Current issues in administration and the economy</td>
</tr>
<tr>
<td>• Legal regulations in the public and private sectors as well as professional secrecy</td>
</tr>
<tr>
<td>• Organisational and technical aspects of privacy</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>none</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensitivity toward privacy needs, insight into the dangers and risks of data manipulation and forgery, knowledge of the legal systems surrounding privacy and the ability to judge situations based on the complex legal systems involved.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Recommended Literature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tinnefeld/Ehmann/Gerling, Einführung in das Datenschutzrecht, Oldenbourg, München</td>
</tr>
<tr>
<td>Magazines: Datenschutz und Datensicherheit, Vieweg, Wiesbaden; Computer und Recht, Dr. Otto Schmidt, Köln; Simitis, Kommentar zum BDSG, Nomos, Baden-Baden</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Method of Instruction</th>
</tr>
</thead>
<tbody>
<tr>
<td>seminars</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Examination</th>
</tr>
</thead>
<tbody>
<tr>
<td>written exam</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Language of Instruction</th>
</tr>
</thead>
<tbody>
<tr>
<td>german</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name of Lecturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beier, Ehmann, Müncke, Petri, Schuster</td>
</tr>
</tbody>
</table>

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#### 2. IT-Security

**Course: IF-Z-BD02**

**4 H/W**

**5 ECTS-Credits**

<table>
<thead>
<tr>
<th>Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Principles, motivation for, and objectives of IT-security</td>
</tr>
<tr>
<td>• Threats and typical attack scenarios</td>
</tr>
<tr>
<td>• Concepts and methods of security management</td>
</tr>
<tr>
<td>• Principles, mechanisms, systems used for authentication, authorisation, administration and auditing</td>
</tr>
<tr>
<td>• Selected examples and practical application areas</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>Principles of IT systems (networks, hardware, operating systems, applications)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>An understanding of problems, principles, concepts and mechanisms ensuring IT security.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Recommended Literature</th>
</tr>
</thead>
<tbody>
<tr>
<td>The most current literature covering IT-security; articles from journals and conferences will be used. Claudia Eckert: IT-Sicherheit. Konzepte, Verfahren, Protokolle, Oldenbourg, München</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Method of Instruction</th>
</tr>
</thead>
<tbody>
<tr>
<td>lectures with discussions and exercises</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Examination</th>
</tr>
</thead>
<tbody>
<tr>
<td>written exam</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Language of Instruction</th>
</tr>
</thead>
<tbody>
<tr>
<td>german</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name of Lecturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gerling, Pleier</td>
</tr>
</tbody>
</table>
## 3. Business Law

### Course: IF-Z-BD03

**Objectives**
- The legal system
- Legal regulations of commercial law (particularly from sections of the german Civil Code pertaining to general parts, laws of obligations, and property laws)
- Introduction to selected case studies
- Particular problem statements in the area of telecommunications as well as software production and licensing

<table>
<thead>
<tr>
<th>Prerequisites</th>
<th>none</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Course objective</strong></td>
<td>Knowledge of the legal principles of commercial law as well as the acquisition of methods to assess the facts of a case and systematically solve simple cases.</td>
</tr>
<tr>
<td><strong>Method of instruction</strong></td>
<td>lectures with discussion</td>
</tr>
<tr>
<td><strong>Examination</strong></td>
<td>written exam</td>
</tr>
<tr>
<td><strong>Language of instruction</strong></td>
<td>german</td>
</tr>
<tr>
<td><strong>Name of lecturer</strong></td>
<td>Möncke</td>
</tr>
</tbody>
</table>

**Prerequisites**
- Privacy and Data Protection (IF-Z-BD01)

**Course objective**
- Ability to make legal, organisational and technical assessments of data protection problems.

**Method of instruction**
- practicum

**Examination**
- term work and presentation

**Language of instruction**
- german

**Name of lecturer**
- Gerling, Schuster

## 4. Practical Studies in Privacy and Data Protection

### Course: IF-Z-BD04

**Objectives**
- Selected legal, organisational and technical case studies from real-world business setting of a data protection official.

<table>
<thead>
<tr>
<th>Prerequisites</th>
<th>Privacy and Data Protection (IF-Z-BD01)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Course objective</strong></td>
<td>Ability to make legal, organisational and technical assessments of data protection problems.</td>
</tr>
<tr>
<td><strong>Method of instruction</strong></td>
<td>practicum</td>
</tr>
<tr>
<td><strong>Examination</strong></td>
<td>term work and presentation</td>
</tr>
<tr>
<td><strong>Language of instruction</strong></td>
<td>german</td>
</tr>
<tr>
<td><strong>Name of lecturer</strong></td>
<td>Gerling, Schuster</td>
</tr>
</tbody>
</table>

## 5. Current Issues in Data Protection

### Course: IF-Z-BD05

**Objectives**
- Concrete threats to privacy and the media, current protection mechanisms

<table>
<thead>
<tr>
<th>Prerequisites</th>
<th>Privacy and Data Protection (IF-Z-BD01)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Course objective</strong></td>
<td>knowledge of the current European data protection laws, applicability to real-world business situations</td>
</tr>
<tr>
<td><strong>Recommended literature</strong></td>
<td>Announced at lecture time.</td>
</tr>
<tr>
<td><strong>Method of instruction</strong></td>
<td>seminars</td>
</tr>
<tr>
<td><strong>Examination</strong></td>
<td>term work</td>
</tr>
<tr>
<td><strong>Language of instruction</strong></td>
<td>german</td>
</tr>
<tr>
<td><strong>Name of lecturer</strong></td>
<td>Petri, Tinnefeld</td>
</tr>
</tbody>
</table>