Berechenbarkeit und Komplexität

Learning Outcomes

On successful completion, students will be able to apply basic concepts in computability, use Turing machines as basic model of computation, understand the border between computable and uncomputable functions, classify problems as being undecidable, understand the meaning of basic complexity classes and classify problems according to their computational difficulty.

Content

Topics include:
- Turing computability and Church-Turing thesis
- Loop- and While-computability
- primitive recursive functions
- Halting problem and undecidability
- Reducibility between problems
- Post correspondence problem
- complexity of algorithms and problems such as SAT and CLIQUE
- complexity of the decision problem for languages, computational complexity, complexity classes
- P, NP and NP-completeness
- Cook-Levin theorem for the satisfiability problem (SAT)

Module Components

<table>
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<th>Course Name</th>
<th>Type</th>
<th>Number</th>
<th>Cycle</th>
<th>SWS</th>
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<td>VL</td>
<td>0401 L 145</td>
<td>WS</td>
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<td>UE</td>
<td>0401 L 145/2</td>
<td>WS</td>
<td>2</td>
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Workload and Credit Points

The Workload of the module sums up to 180.0 Hours. Theorefor the module contains 6 Credits.

Description of Teaching and Learning Methods

No information

Requirements for participation and examination

Desirable prerequisites for participation in the courses:

No information

Mandatory requirements for the module test application:

No information
Module completion

**Grading:**
graded

**Type of exam:**
Portfolio examination

**Language:**
German

**Duration of the Module**
This module can be completed in one semester.

**Maximum Number of Participants**
This module is not limited to a number of students.

**Registration Procedures**
No information

**Test description:**
No information

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<th>Test elements</th>
<th>Categorie</th>
<th>Points</th>
<th>Duration/Extent</th>
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**Grading:**
This exam uses its own grading scale (see test description).

**Test description:**
No information

**Recommended reading, Lecture notes**

**Lecture notes:**
No information

**Electronical lecture notes:**
available

**Additional information:**
Folien werden über www.isis.tu-berlin.de verfügbar gemacht

**Recommended literature:**
Uwe Schöning: Theoretische Informatik - kurzgefasst, Spektrum Akademischer Verlag, 5. Auflage, 2008

**Assigned Degree Programs**
This module is used in the following modulelists:

**Informatik (Bachelor of Science)**
StuPO 2015
Modulisten der Semester: WS 2017/18 SS 2018 WS 2018/19

**Naturwissenschaften in der Informationsgesellschaft (Bachelor of Science)**
StuPO 2013
Modulisten der Semester: WS 2017/18 SS 2018 WS 2018/19

**Naturwissenschaften in der Informationsgesellschaft (Bachelor of Science)**
StuPO 2017
Modulisten der Semester: WS 2017/18 SS 2018 WS 2018/19

**Miscellaneous**
No information