



Computational Complexity

Module title:

Computational Complexity

Credits:

9

Responsible person:

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Contact person:

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Website:
<http://www.akt.tu-berlin.de/menue/teaching>
Display language:

Englisch

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Learning Outcomes

On successful completion, students will be able to:

- estimate the computational costs for solving fundamental problems
- classify discrete computational problems according to their computational complexity using reductions and standard complexity classes
- understand structural properties of complexity classes
- make qualitative and quantitative statements about computational complexity questions

Content

Introduction into structural complexity theory, with particular emphasis on complexity resources time and space.

Particular topics are:

- complexity classes
- reductions between problems
- theory of the NP-completeness and the P vs. NP question
- hierarchy theorems and polynomial time hierarchy
- interactive proof systems

Module Components

Course Name	Type	Number	Cycle	SWS
Computational Complexity	VL	0434 L 233	k.A.	4
Computational Complexity	UE	0434 L 233	k.A.	2

Workload and Credit Points

Computational Complexity (Vorlesung)	Multiplier	Hours	Total
Präsenzzeit	15.0	4.0h	60.0h
Vor-/Nachbereitung	15.0	5.0h	75.0h
			135.0h
Computational Complexity (Übung)	Multiplier	Hours	Total
Präsenzzeit	15.0	2.0h	30.0h
Vor-/Nachbereitung	15.0	5.0h	75.0h
			105.0h
Course-independent workload	Multiplier	Hours	Total
Prüfungsvorbereitung	1.0	30.0h	30.0h
			30.0h

The Workload of the module sums up to 270.0 Hours. Therefore the module contains 9 Credits.

Description of Teaching and Learning Methods

There is a lecture 4 hours per week presenting the whole course material. The lectures are accompanied by tutorials in which distributed work sheets are solved together.

Requirements for participation and examination

Desirable prerequisites for participation in the courses:

- a) obligatory: Basic course on automata and complexity
- b) desirable: Basic knowledge on algorithms

Mandatory requirements for the module test application:

No information

Module completion

Grading: graded	Type of exam: Oral exam	Language: English	Duration/Extent: 30 min
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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

Please register at QISPOS or directly at the examination office.

Recommended reading, Lecture notes

Lecture notes:
unavailable

Electronical lecture notes :
available

Additional information:

Slides will be made available during the lecture period: www.isis.tu-berlin.de

Recommended literature:

Christos H. Papadimitriou: Computational Complexity, Addison Wesley, 1994.

Sanjeev Arora, Boaz Barak: Computational Complexity: A Modern Approach, Cambridge University Press, 2009

Assigned Degree Programs

This module is used in the following modulelists:

Computer Engineering (Master of Science)

StuPO 2015

Modullisten der Semester: SS 2017 WS 2017/18 SS 2018 WS 2018/19 SS 2019

Computer Science (Informatik) (Master of Science)

StuPO 2015

Modullisten der Semester: SS 2017 WS 2017/18 SS 2018 WS 2018/19 SS 2019

Double-Degree-Masterstudiengang ICT Innovation (Master of Science)

MSc ICT Innovation StuPO 2016

Modullisten der Semester: SS 2017 WS 2017/18 SS 2019

Elektrotechnik (Master of Science)

StuPO 2015

Modullisten der Semester: SS 2017 WS 2017/18 SS 2018 WS 2018/19 SS 2019

Informatik (Master of Science)

MSc Informatik PO 2013

Modullisten der Semester: SS 2017 WS 2017/18 SS 2018 WS 2018/19 SS 2019

Miscellaneous

This course is not offered regularly, you will find detailed information on our website: <http://www.akt.tu-berlin.de/menue/teaching/>