

<b>Name of Module:</b> Computational Complexity		<b>CP (ECTS):</b> 9	<b>Short Name:</b> MINF-CompuComplex.W11
<b>Person Responsible for Module:</b> Prof. Rolf Niedermeier	<b>Secretariat:</b> TEL 5-1	<b>e-mail address:</b> rolf.niedermeier@tu-berlin.de	
<b>Module Description</b>			

<b>1. Qualification Aims</b>
<p>Participants of this module can classify discrete computational problems according to their computational complexity using standard complexity classes. They understand structural properties of complexity classes and can make qualitative and quantitative statements about computational complexity questions.</p> <p>The course is <b>principally</b> designed to impart  technical skills <b>50%</b>, method skills <b>50%</b> system skills <b>0%</b> social skills <b>0%</b></p>

<b>2. Content</b>
<p>Introduction into structural complexity theory, with particular emphasis on complexity resources time and space. Particular topics are:</p> <ul style="list-style-type: none"> <li>complexity classes</li> <li>theory of the NP-completeness</li> <li>hierarchy theorems and polynomial time hierarchy</li> <li>interactive proof systems</li> </ul>

<b>3. Module Components</b>					
Course Name	Course type	Weekly hours per semester	CPs (acc. to ECTS)	Compulsory(C) / Compulsory Elective (CE)	Semester (WiSe / SoSe)
Computational Complexity	VL+TU	4+2	9	C	SoSe

<b>4. Description of Teaching and Learning Methods</b>
<p>There is a lecture 4 hours per week presenting the whole course material. The lectures are accompanied by 2-hour tutorials, where an active participation and homework on the work sheets distributed every week is required.</p>

<b>5. Prerequisites for Participation</b>
<p>a) obligatory: Basic course on automata and complexity  b) desirable: Basic knowledge on algorithms</p>

<b>6. Target Group of Module</b>
<p>Computer Science Master with focus "Intelligent Systems"  Computer Science Master with focus "Reliable Systems"  Computer Science Master with focus "System Engineering"  Computer Science Diploma  Computer Engineering Master with focus "Software Engineering"  Computer Engineering Diploma</p>

<b>7. Work Requirements and Credit Points</b>		
Course Type	Calculation Factor	Hours
Lecture	15x4	60
Exercises	15x2	30
Private study, including homework and exam preparation		180
Total		270

<b>8. Module Examination and Grading Procedures</b>
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Final oral exam determining the grade (MP). As a prerequisite, an active participation in the tutorials with presentation of own solutions of exercises is mandatory.

**9. Duration of Module**

1 semester

**10. Number of Participants**

Max. 30 participants

**11. Enrolment Procedures**

<http://www.akt.tu-berlin.de/>

**12. Recommended Reading. Lecture Notes**

Lecture notes available in paper form?      yes       no   
Lecture notes available in electronic form?      yes       no

**Recommended Reading:**

Christos H. Papadimitriou: Computational Complexity, Addison Wesley, 1994.  
Sanjeev Arora, Boaz Barak: Computational Complexity: A Modern Approach, Cambridge University Press, 2009.

**13. Other Information**

The german title of the module is "Komplexitätstheorie".