

Advanced Data Structures

Lecture 00: Course Overview

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Organizational Matters

Lectures

- Monday 14:00–15:30 (50.34, 236)
- lecture only

Project (mandatory)

- topics will be handed out 03.05.2023
- coding project and small presentation
- 20 % of the final grade
- requires additional registration

Oral Exam

- 20 minutes
- 80 % of the final grade
- pizza marks content not relevant for exam



Office Hours (Room 208)

- Monday 15:45–16:30 (lecture period)
- by appointment (otherwise)

Materials

Slides

- published before the lecture
(<https://ae.itl.kit.edu/4719.php>)
- or in ILISA
- before means like 10 to 15 minutes before

Recordings

- recordings exist online
(<https://youtube.com/@kurpicz>)
- new topics will be recorded

Additional Material

- references to literature included
- most likely no script
- MIT course (some topics match)
<https://ocw.mit.edu/courses/6-851-advanced-data-structures-spring-2012/>

Content

Trees/Graphs

- bit vectors and succinct trees
- dynamic bit vectors and succinct trees
- succinct graphs

External Memory

- cache-oblivious B-trees
- buffer trees and EM lookup

Integers









- range minimum queries (lowest common ancestor queries)
- predecessor queries
- vEB-tree and fusion trees

Strings

- string B-trees and suffix arrays
- compressed suffix array and suffix tree

Gap Between Theory and Practice (Lecture AE Sanders)

Different Viewpoints

Theory			Practice	
simple		application model		complex
simple		machine model		real
complex		algorithms	<code>FOR</code>	simple
advanced		data structures		arrays, ...
worst case	<code>max</code>	complexity measure		inputs
asymptotic	$\mathcal{O}(\cdot)$	efficiency	<code>42%</code>	constant factors