



Algorithms and Data Structures

Conditional Course

Introduction / General Info

Winter Term 2022/23

About the Course



Topics

- Introduction to basic algorithms and data structures
- Sorting, searching, hashing, search trees, shortest paths, alg. analysis

No live lectures

- There are recordings which you are supposed to watch

Exercises

- There will be weekly exercises which you should do
 - Exercises will be theoretical and practical
 - Not mandatory, but highly recommended

Exam: 20 min oral exam at the end of the semester

About the course



What is the purpose of the course?

Who is it targeted to?

- The course is for incoming M.Sc. students who do not have the necessary background required by the M.Sc. program.
 - E.g., students who did not study computer science or students from more applied schools, ...

- All necessary information about the courses will be published on the course websites:
 - Go to my group’s website: <http://ac.informatik.uni-freiburg.de>
 - Then follow teaching – winter term 2022/23 – Conditional Course “Algorithms and Data Structures”
- Please check the website for
 - Recordings and slides
 - Exercises and sample solutions
 - Pointers to additional literature
 - Information about the exam
 - ...

- Zulip is a group chat / forum (<https://zulip.com>)
- We have our own Zulip server, which we will use for online discussions regarding our lectures.
 - In addition to the website, please check Zulip for announcements, etc.
 - Use Zulip to discuss questions regarding the lecture / exercises.
- There is a link on the course webpage that you can use to sign up for our Zulip server.
 - To access the link, you have to be in the university network (i.e., at the university or through VPN)

There will be weekly exercise sheets:

- **Exercise sheets** are **published** at the latest **on Tuesday** on the website
- Exercises are **due Wednesday at 12:00** in the **following week**
- If you want your exercises graded, hand in your exercises in time
- For the exercises, you are encouraged to build groups
- If you work in a group, the group should hand in one solution
 - Make sure that all students participate in solving & writing!
- After getting back your exercises, you can meet and discuss the exercises with the TA on Wednesdays 12:15 – 14:00

Exercise Tutorials

Assistants for the course:

- Mohsen Al-Zeqri, mmalzzaqri15@eng.just.edu.jo
- Gustav Schmid, sch.gus@gmx.de

Weekly Tutorials:

- There is a weekly tutorial on Wednesday from 12:15 – 14:00
- The tutorials are in-person (physically) in room 106-00-007
- In the tutorial, we discuss the upcoming exercise sheet and your solutions of the last exercise sheet
- Also ask the assistants if you have any questions!

The exercises are the most important part of the course!

- To pass the exam, it is important that you do the exercises
- If you feel comfortable with all the exercises, you should also be able to pass the exam

- When working in groups, make sure that you all participate in solving the questions and in writing the solutions!
 - You should all be able to explain your solutions.

Purposes of the Alg. & D. S. Course

Goal: Basic understanding of how to efficiently handle and process data on a computer

- For fundamental problems that occur in essentially any larger computer program / project

Algorithms:

- How to solve complex computational problems efficiently

Data Structures:

- How to store data in an effective way so that it can be accessed efficiently



Algorithms and Algorithm Analysis:

- O-Notation
- Sorting
- Divide-and-Conquer
- Shortest Paths / Graph Traversal
- Dynamic Programming
- String Matching

Data Structures:

- Hash Tables
- Linked Lists and Binary Search Trees
- Priority Queues / Heaps
- Graph Representations

Questions?

