



# Administrativa

14 Oktober 2024

Prof. Dr. Sebastian Wild

# Goals for Today

- ▶ give you some detail on **what** this module covers

~> so that you can decide whether to keep it

↖ if it is an elective module for you

Efficient Algorithms / Effiziente Algorithmen

- ▶ inform you about **how** EA is run
- ▶ inform you about how EA is **assessed**

# Welcome to CS 566 – Efficient Algorithms

- ▶ Dozent: Prof. Dr. Sebastian Wild

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- Betreuer: Nikolaus Glombiewski

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- Tutor: Hannes Feil feilh@students.uni-marburg.de

- ▶ Module website: [www.wild-inter.net/teaching/ea](http://www.wild-inter.net/teaching/ea)

→ your first address for any infos on CS566

- ▶ *Campuswire*: collaborative Q&A (more on this later)  
**also used for announcements**  
→ please register via link from the ILIAS announcement

<https://campuswire.com/p/G1B550BF9>

PIN 3740

- ▶ *Slido*: student response system for formative feedback → bring a smart device to class!
- ▶ Final mark: 100% final exam (Klausur)  
Zulassungsvoraussetzungen zur Klausur: 50% of points from exercise sheets



# A Note on Languages

- ▶ Module is mostly in German
  - ▶ in particular examinations
  - ▶ except as prerequisite for English MSc admission  
If that's you, stay tuned.  
I'll come to that!
- ▶ some written material in English
  - ▶ in particular slides
- ▶ Why?
  - ▶ English is the *lingua franca* of our time  
⇨ you profit from exposure
  - ▶ people (=future employers!) will assume you can at least read
  - ▶ in young computer science, technical terms are already English
- ▶ Also, it's 2024! AI tools bridged lots of language gaps 🤖  
Linguee & DeepL, Google Translate, ChatGPT



# CS 566 for Credit vs. for Conditional Admission

## ▶ (Normal / for-credit version of) CS 566:

- ▶ Taken by students in various undergrad or masters programs
- ▶ Compulsory for German *BSc Data Science*
- ↪ Offered in German (including exams)

## ▶ CS 566 for conditional admission (into *MSc Data Science*):

- ▶ full program in English, international students
- ↪ Separate English examinations
  - ▶ formally separate from CS 566
  - ▶ examination is pass/fail only
  - ▶ **If required for admission, you cannot also take CS 566 for credit.**
- ▶ Examination based on English self-study materials (not full lectures) ↪ module website
- ▶ Welcome to attend lectures, and tutorials (space permitting)
- ▶ Join the Campuswire Q&A and team up with others to study!

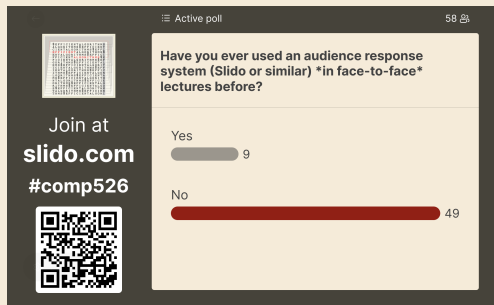
↪ Required to do the conditional admission version?

Join us **tomorrow (Oct 15), 4pm, Hörsaal A in H|05** for additional info!

# Audience Response System: *Slido*

- ▶ Goal: Collect immediate, formative feedback
  - ▶ Stay focused and engaged! (“active learning”)
  - ▶ Quick feedback (for you individually) if you are on track.
  - ▶ Quick feedback (for me) whether (most of) you are on track.
- ▶ Slido has 2 useful features:

## 1. Quick Polls



The screenshot shows the Slido interface for a quick poll. On the left, there is a QR code and the text "Join at slido.com #comp526". The main area displays the poll question: "Have you ever used an audience response system (Slido or similar) \*in face-to-face\* lectures before?". Below the question, there are two horizontal progress bars. The "Yes" bar is grey and shows 9 responses. The "No" bar is red and shows 49 responses. The top of the interface shows "Active poll" and "58" participants.

Join at  
**slido.com**  
**#comp526**

Have you ever used an audience response system (Slido or similar) \*in face-to-face\* lectures before?

Yes 9

No 49

## 2. Audience Questions



The screenshot shows the Slido interface for audience questions. On the left, there is a QR code and the text "Join at slido.com #comp526". The main area displays a list of questions under the heading "Q&A". The first question is from Sebastian Wild: "How can I ask a question in class?". The second question is from an anonymous user: "I'm a bit unsure, I'd rather ask this anonymously.". The top of the interface shows "Q&A", "Popular", and "2" questions.

Join at  
**slido.com**  
**#comp526**

Q&A


Sebastian Wild  
How can I ask a question in class?

Anonymous  
I'm a bit unsure, I'd rather ask this anonymously.

# My approach to lectures

**My conclusions** (from years of own experience, a pandemic, and observing others)

irrespective of the  
mode of delivery!



- 0. Good explanations (intuitions!) and well-structure material are the most important aspect.
- 1. **Synchronous (live) lectures** beat videos in keeping up with class. (but recordings are great!)
- 2. Only a small minority of students asks questions in class. ~~~ other backchannels
- 3. **Interaction** makes content memorable (and keeps brains awake!) ~~~ *Slido* tasks

# Components of EA

## **Slido questions**

immediate feedback  
simple questions

## **Lectures**

new material  
discussions  
big picture

## **Tutorials**

get practice solving problems  
solve deep questions

## **Campuswire**

collaborative Q&A knowledge base

## **Exam Question Gallery**

collaborative pool of potential and past exam problems

## **Final Exam**

summative assessment  
of your acquired skills



# Overview of the module

## Goals:

- ▶ build / enhance your toolbox of algorithmic methods and techniques  
    ~> here: focus on practical methods
- ▶ enable you to reason about and communicate algorithmic solutions  
    ~> level of abstraction, proofs, mathematical analysis, vocabulary
- ▶ enable you to apply, combine and extend methods

## Units: (preliminary plan)

- |                                       |                                    |
|---------------------------------------|------------------------------------|
| <b>0. Administrativa</b>              | <b>8. Clever Codes</b>             |
| <b>1. Proof Techniques</b>            | <b>9. Graph Algorithms</b>         |
| <b>2. Machines &amp; Models</b>       | <b>10. Parallel Algorithms</b>     |
| <b>3. Fundamental Data Structures</b> | <b>11. Greedy Algorithms</b>       |
| <b>4. Efficient Sorting</b>           | <b>12. Dynamic Programming</b>     |
| <b>5. Divide &amp; Conquer</b>        | <b>13. Text Indexing</b>           |
| <b>6. String Matching</b>             | <b>14. Compressed Text Indices</b> |
| <b>7. Text Compression</b>            | <b>15. Range-Minimum Queries</b>   |

# Assessments

- ▶ **Module mark** = mark in final written exam
- ▶ **Final exam**
  - ▶ written examination
  - ▶ Preliminary dates:
    1. 25 Feb 2025
    2. 26 March 2025
- ▶ To pass the module, you have to pass either of the exams
  - ▶ If you pass the first exam, you *cannot* take the second to improve you mark
- ▶ **Admission requirements to final exam**
  - ▶  $\leq 2$  exercise sheets with 0 points in your group (not handed in implies 0 points)
  - ▶  $\geq 50\%$  of available points in sum over all exercise sheets
  - ▶ We plan with 12 marked exercise sheets in total

stay tuned ...

# Tutorials

- ▶ *Exercise Sheet* (Übungsblatt)
  - ▶ released on module website every **Friday**
  - ▶ to be **handed in**
    - ▶ until 19:00 the Friday after release  
(1 week to work it out)
    - ▶ in **groups** of 3 students
    - ▶ online on ILIAS
  - ▶ practice problems (some old exam questions, too!)
  - ▶ enhancement problems
- ▶ in *tutorials*
  - ▶ discussion of solutions (in the week after hand-in)
  - ▶ work on **in-class exercises** (Präsenzaufgaben)
    - ▶ to prepare you for next marked exercise sheet
    - ▶ *not* handed in or marked

*Use the tutorials to **practice your thinking!*** = Don't cheat yourself!

*"If I tell you to run 10km,  
it isn't because I want you  
to be 10km away from me."*

# Generative AI

*We live in exciting times!*

LLMs (ChatGPT etc.), Media generators  
(Midjourney etc.), GitHub CoPilot, ...

- ▶ Generative Artificial Intelligence (GenAI) is amazing!
  - ▶ full of flaws (hallucination, bias, copyright, data privacy, cost, ...)
  - ▶ and yet ... often helpful, surprisingly versatile

- ▶ Why not use for everything?

- ▶ Need for *deeply skilled* humans here to stay (for now anyways)

↪ **Skill comes from practice!** (We still teach mental arithmetic in primary school!)

assessments designed for upskilling *humans*

↪ For our assessments:

***Don't take away the **thinking!** = Don't cheat yourself!***

## Acceptable use:

- ▶ preparatory research  
(≈ Wikipedia)
- ▶ proof reading  
(spelling, grammar)

## Unacceptable use: (not exhaustive!)

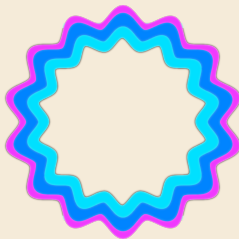
- ▶ use generated parts w/o acknowledgment & citation
- ▶ tools to paraphrase others' work to pass as own
- ▶ generated parts with inappropriate prompt,  
e. g., "write me a conclusion for this essay"



# What is Campuswire?

*Campuswire* is an online space for lectures

1. ***Class Feed***: questions on material
2. ***Chatrooms***: structured social space  
similar to Slack or Discord



**Join** via link on website:  
[campuswire.com/p/G1B550BF9](https://campuswire.com/p/G1B550BF9)

Use in browser  
[campuswire.com/c/G1B550BF9](https://campuswire.com/c/G1B550BF9)

or via app  
[campuswire.com/download](https://campuswire.com/download)

We use Class Feed for **collaborative Q&A**

- ▶ Ask ***public*** questions
  - ▶ “Why is  $\lg(n^3) = \Theta(\log n)$ ?”
  - ▶ “Will there be classes on public holidays?”
- ▶ ***Answer* your peers’ questions!**
  - ▶ Know the answer? → put it in!
  - ▶ Know a partial answer? → Post it, others can build on it!
  - ▶ Found a helpful answer (or question)? → Vote it up!
- ▶ Ask ***private*** questions
  - ▶ if your question might contain “spoilers” for assessments
  - ▶ if you feel the answer is only relevant for you personally

# How to Campuswire

- ▶ Our goals for Campuswire Q&A:
  1. **be fair**    Same answers for everyone
  2. **learning by teaching**    YOU will answer most questions!
  3. **be inclusive**    posts can be anonymous; you can take your time to ask and answer
  
- ▶ Therefore, we instructors will
  - ▶ redirect you to Class Feed for questions,
  - ▶ wait before answering, to give other students a chance to answer first,
  - ▶ explicitly mark good answers (and questions!) as such

# ILIAS

- ▶ Official announcements
- ▶ Hand-in of exercise sheets
- ▶ Announcement of marks

... what can be on the public module website  
goes to the public module website!



# Exam Question Gallery

- ▶ We jointly collect a **pool of exemplary exam questions**.
- ▶ *You add **your** questions to it.*
- ▶ I will give feedback which questions are realistic.
- ▶ *... and we will pick one if there's sufficiently many good ones!*

↪ great resource for exam preparation

↪ We will answer selected questions in recap session (last week of classes)

- ▶ Engage in this early and pose great questions

- ▶ Start today: <https://tiny.cc/ea-exam-question-gallery>



# Philosophy of the module

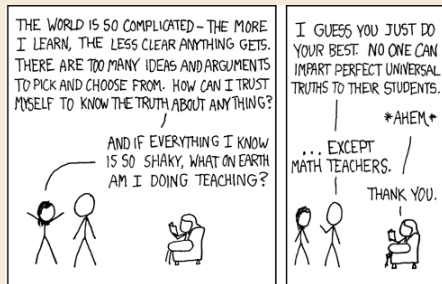
CS566 is part of a *scientific* course.

Less ...



<https://imgur.com/gallery/vx118>

... and more



<https://xkcd.com/263/>

~> Focus on *universal truths* of practical algorithms

- ▶ model of reality (machines, programs, data)
- ▶ quantitative predictions
- ▶ validate model in experiments

~> Need some math techniques. (up next)