0 Administrativa

14 Oktober 2024

Prof. Dr. Sebastian Wild

CS566 (Wintersemester 2024/25)
Philipps-Universität Marburg
version `2024-10-14 14:32`

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
  Mehrzweckgebäude, Raum 05 D 16
  wild@informatik.uni-marburg.de

Betreuer: Nikolaus Glombiewski
glombien@informatik.uni-marburg.de

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

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- Module website: `www.wild-inter.net/teaching/ea`
  → your first address for any infos on CS 566

- *Campuswire:* collaborative Q&A (more on this later)
  also used for announcements
  → please register via link from the ILIAS announcement
  `https://campuswire.com/p/G434E54CB` PIN 8378

- *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.

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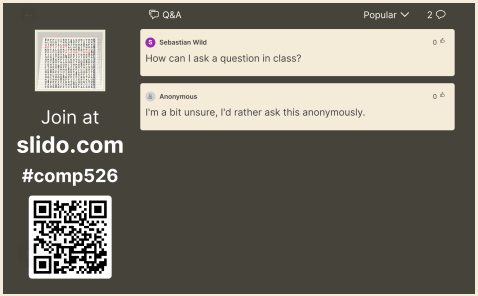
- Slido has 2 useful features:

1. Quick Polls

2. Audience Questions



Clicker Question

Have you used an audience response system (Slido or similar) in lectures before?

A Yes

B No

→ *sli.do/cs566*

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

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Units: (preliminary plan)

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

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**
  - ≤ 2 exercise sheets with 0 points in your group (stay tuned . . .)
    (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

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!)

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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"

Clicker Question

What do you think is the **#1 predictor** of whether a student cheats in assessments?

→ *sli.do/cs566*

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Source: youtu.be/sMpC8QwWSbI

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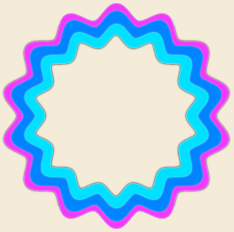
What is Campuswire?

Campuswire is an online space for lectures

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



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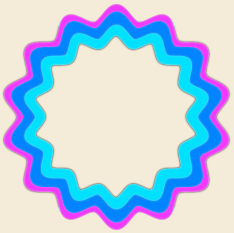

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We use Class Feed for **collaborative Q&A**

- 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

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- 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

CS 566 is part of a *scientific* course.

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Less . . .

https://imgur.com/gallery/vX118

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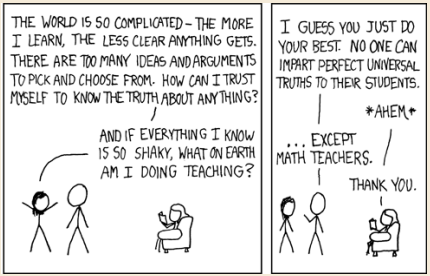

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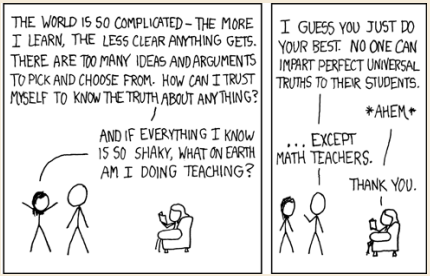

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- ⇝ Focus on *universal truths* of practical algorithms
  - model of reality (machines, programs, data)
  - quantitative predictions
  - validate model in experiments

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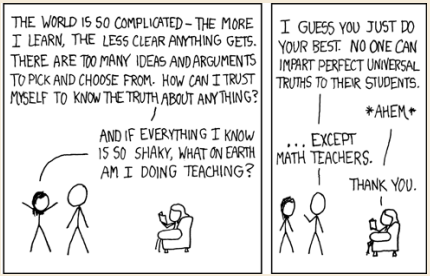

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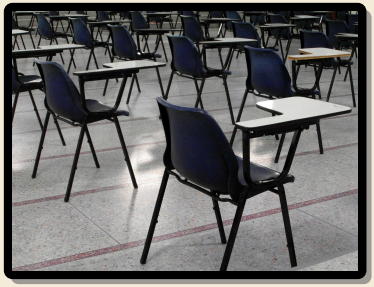
- ⇝ Focus on *universal truths* of practical algorithms
  - model of reality (machines, programs, data)
  - quantitative predictions
  - validate model in experiments
- ⇝ Need some math techniques. (up next)

But before we start . . .



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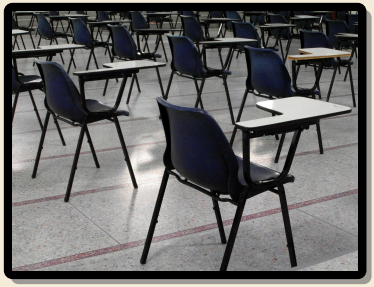

Prior-knowledge survey

- not graded
- anonymous
- *formative* assessment
  - helps me to tailor teaching to needs
  - helps you to know where you and others stand
- Questions cover various topics, some are tough

I don't expect you can answer everything!
We don't need everything for CS566!

`tiny.cc/ea-survey`