ALGORITHMS OF BIOINFORMATICS

0 Administrativa

16 October 2025

Prof. Dr. Sebastian Wild

CS594 (Winter 2025-26)
Philipps-Universität Marburg
version `2025-10-16 12:00`

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

  Algorithms of Bioinformatics
- inform you about **how** AlgBio is run
- inform you about how AlgBio is **assessed**

Welcome to CS 594 – Algorithms of Bioinformatics

- Dozent: Prof. Dr. Sebastian Wild
  Mehrzweckgebäude, Raum 05 D 16
  wild@informatik.uni-marburg.de

  Tutor: Mohammed Omer omerm@students.uni-marburg.de

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- Module website: www.wild-inter.net/teaching/advalg
  → your first address for any infos on CS 627

- *Campuswire:* collaborative Q&A (more on this later)
  also used for announcements
  → please register via link from the ILIAS announcement
  https://campuswire.com/p/GEFF103D2 PIN 1583

- *Slido:* student response system for formative feedback → bring a smart device to class!

- Final mark: 100% final exam
  Admission to exam: 50% of points from exercise sheets

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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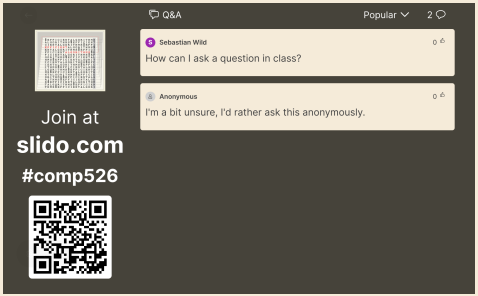
- Slido has 2 useful features:

1. Quick Polls

2. Audience Questions



Clicker Question

Which of the following online systems have you used before?
Select all that apply.

("used" means more than "tried it out once", but you need not be a professional user)

- **A** ILIAS
- **B** Slido
- **C** Campuswire
- **D** ChatGPT
- **E** Gemini
- **F** Claude
- **G** GitHub Copilot
- **H** Some other LLM-based chat assistant
- **I** None of these

→ *sli.do/cs594*

What to expect in AlgBio?

- algorithms with a (micro)biology backdrop
- **not** extensive material from biology
  - but various bits and pieces
  - inspiration from and pointers to further reading
- methodology: design and analysis of algorithms, mathematical proofs

Overview of the module

Goals:

- survey algorithmic contributions in computational biology (and apply your algorithms toolkit!)
- learn selected terminology and mechanisms of molecular biology
- know strengths and flaws of bioinformatics methods and judge their suitability
- prepare you for working on current topics of bioinformatics

Overview of the module

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Units: (preliminary plan)

0. **Administrativa**
1. Puzzle from the Lab
2. Hidden Messages
3. Comparing Sequences
4. Assembling Genomes
5. String Matching
6. Suffix Trees
7. Googling Genomes
8. RNA Secondary Structures
9. Phylogenetic Trees

Assessments

- **Module mark** = mark in final exam
- **Final exam**
  - written or oral examination
- **Exam Material:** everything covered in lectures (except marked "$\notin$ exam")
  everything covered in **tutorials** and exercise sheets
- **Admission requirements to final exam**
  - ≤ 2 exercise sheets with 0 points in your group
    (not handing in implies 0 points)
  - $\geq 50\%$ of available points in sum over all exercise sheets

stay tuned . . .

Tutorials

- *Exercise Sheet* (Übungsblatt)
  - released on module website
  - to be **handed in**
    - handin on ILIAS
    - in **groups** of 3–4 students
  - practice problems
  - enhancement problems
- in *tutorials*
  - discussion of selected solutions

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- in *tutorials*
  - discussion of selected solutions
- **Marking**
  - Mainly for your feedback
  - Serious attempts will yield partial credit even if unsuccessful

*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, DeepSeek etc.),
Media (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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assessments designed for upskilling *humans*

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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/cs594*

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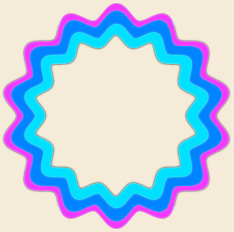
Source: youtu.be/sMpC8QwWSbI

→ *sli.do/cs594*

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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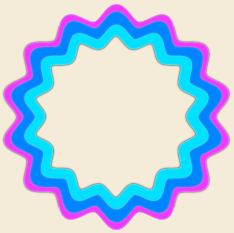

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We use Class Feed for **collaborative Q&A**

- Ask *public* questions
  - *"Why is* $\lg(n^3) = \Theta(\log n)$*?"*
  - *"Will there be classes on regional holiday X?"*
- ***Answer*** **your peers' questions!**
  - Know the answer? → put it in!
  - Know a partial answer? → Post it, others can build on it, instructors can endorse 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* work out most questions (collectively)!
  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**.
  (just a shared Google Doc, link on module website)
- ***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!*

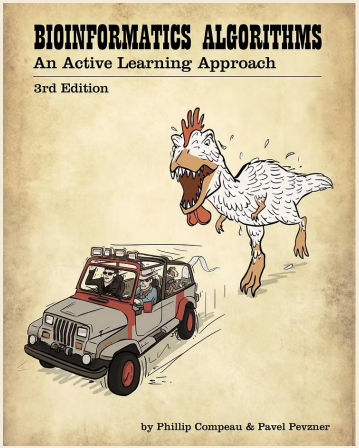
⇝ great resource for exam preparation

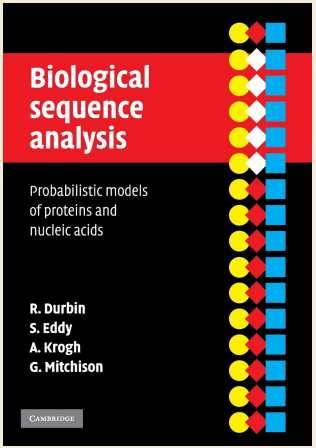
⇝ We will answer selected questions in recap session (last week of classes)

- Engage in this early and pose great questions!

Books and Resources

Main sources for further reading: (further listed on module website, especially informal biology sources)





Bioinformatics Algorithms also available as practical **interactive online text**
Discount codes on Campuswire!