

ALGORITHMS OF BIOINFORMATICS

Administrativa

16 October 2025

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

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`
- ▶ Module website: www.wild-inter.net/teaching/algbio
→ your first address for any infos on CS 594
- ▶ *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.
- ▶ Slido has 2 useful features:

1. Quick Polls



2. Audience Questions

The screenshot shows the Q&A section of Slido. It includes a QR code for joining at slido.com with the hashtag #comp526. Two questions are listed: one from "Sebastian Wild" asking how to ask a question in class, and one from "Anonymous" expressing uncertainty about asking anonymously. The interface is dark-colored with a light header.

User	Question	Responses
Sebastian Wild	How can I ask a question in class?	0 0
Anonymous	I'm a bit unsure, I'd rather ask this anonymously.	0 0

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

Units: (preliminary plan)

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

Assessments

- ▶ **Module mark** = mark in final exam
- ▶ **Final exam**
 - ▶ written or oral examination
- ▶ **Exam Material:** everything covered in lectures (except marked “~~€~~ 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
- ▶ **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!)



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!)

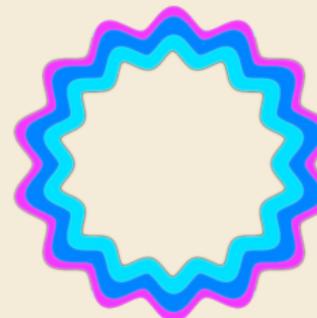
- ▶ use generated parts w/o acknowledgment & citation
- ▶ tools to paraphrase others' work to pass as own
- ▶ generated parts with inappropriate prompt,
e. g., "write me a conclusion for this essay"

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

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

Join via link on website:
campuswire.com/p/GEFF103D2

Use in browser
campuswire.com/c/GEFF103D2
or via app
campuswire.com/download

Using PIN 1583

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
- ▶ 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

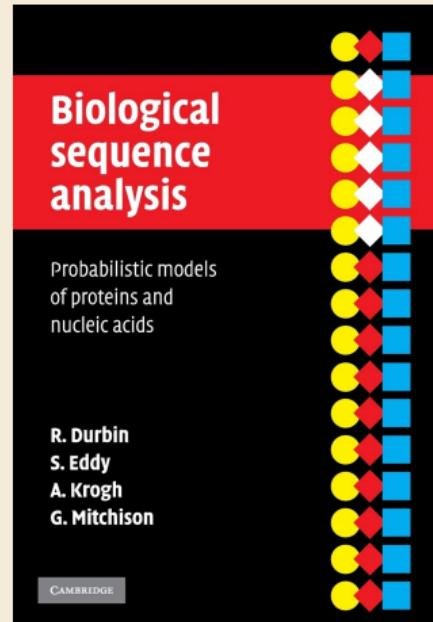
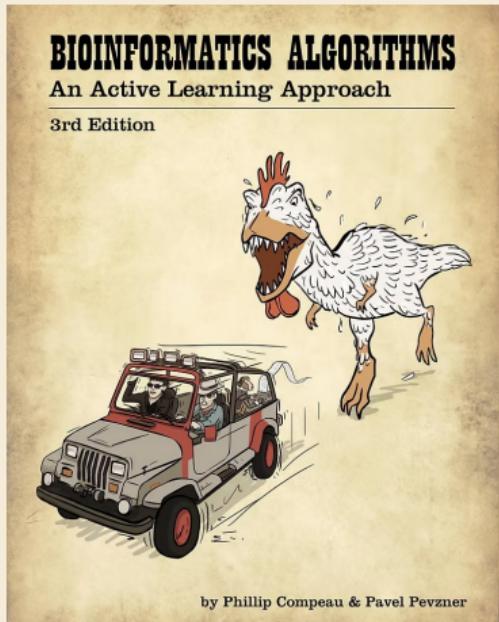
~~ We will answer selected questions in recap session (last week of classes)

- ▶ 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!