

Introduction to Discrete Mathematics and Algorithms (IDMA 2026)

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Lecture 1
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Discrete

- numbers, logic, graphs, combinations
- **not** continuous functions, derivatives, integrals, et cetera

Mathematics

- Start from obvious facts — **axioms**
- **Derive true facts** from these axioms
- We'll be far from fully axiomatic treatment, but will stress **rigorous reasoning**
- In mathematics, we establish **absolute truths**
- Very different from other fields of science using hypotheses and experiments

... and Algorithms

- Our computational problems have **concrete, correct answers** (so no ML predictions)
- **Algorithms** are **precise descriptions of automated methods** for solving such problems (focusing on discrete objects)
- Can be coded up in different programming languages
- But we won't have programming assignments in this course — focus on descriptions in pseudocode rather than exact syntax

Pro Tips

- Read course material before lectures
- Maybe even watch online videos for challenging topics (on Absalon or the internet)
- Take notes **by hand** during lecture — solid research that this is beneficial
- Read course material again after lectures
- Work on exercises
- The material covered in this course is absolutely fundamental — learning it well will save you tons of time throughout your studies

Mathematics

- Definitions of important concepts
- Theorems (and lemmas)
- **Proofs**
- Develop your abilities for rigorous (but creative!) reasoning

Algorithms

- (Pseudo)code
- Proofs of correctness
- Analysis of efficiency/complexity

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In my day job, I do research on

- Proving really hard problems are really hard
- Solving them as fast as possible anyway
- Generating proofs that solutions are correct



Lecturer

- Jakob Nordström

Teaching assistants

- Anton Friis
- Christoffer Kassøe Juhl
- Cornelius Juul Mogensen
- Florestan Brunck
- Johannes Tang Reuss
- Theo Fabris
- Örn Steinar Sigurbjörnsson

- **The good news:** You have a legal right to have this course taught in Danish
- **The bad news:** According to university rules, Swedish counts as Danish for official purposes
- **The pragmatic solution:** Let's continue in English. . .

What **You** Need to Do

- Be on top of **course planning**
- Follow **lectures** (or digest course material on your own)
- Read **textbooks** before and in between lectures (**lectures do not cover everything**)
- Work on **exercises** (and use TAs at exercise classes)
- Solve and hand in **problem sets** (**required for exam**)
- Interact with coursemates — help each other!

Do yourself a big favour:

- **Work really hard** on this course!
- Will help you massively in later courses
- (And pay back all time invested)

Problem Sets

- Will help you study throughout the course (instead of panicking the week before the exam, when it will be far too late)
- Problems are from old exams, so tell you what to expect
- Graded in the same way that exam will be graded
- You get individualized coaching for your attempted solutions
- And even personal feedback on whether revised solutions are corrected as needed
- **And it's for free!** You don't even have to pay for it! Amazing. . .
- It is hard to think about a better way of preparing for the exam

Summary of Problem Set Rules (Check Absalon for Details)

- Collaborate in groups of 2–3 but **write everything up individually**
- **No copying or sharing** of text, pseudocode, formulas, figures, whatever
 - ▶ from each other
 - ▶ from the internet
 - ▶ from your favourite chatbot
- Plagiarism will be reported (but more importantly, it's stupid and self-destructive)
- **Submit on time** via Absalon as PDF file
- Write up in \LaTeX (or possibly other math-aware typesetting system)
- Graded solutions returned after roughly one week
- Corrections needed? One week for resubmission
- **Need to pass all problem sets** to be eligible for exam
- Any problems or questions regarding the problem sets? Ask your TAs!

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Questions? Ask now or see me after the lecture!