

TATA82 Discrete mathematics, 6 credits, spring 2026

Course webpage: <http://courses.mai.liu.se/GU/TATA82/>

Examiner

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Literature

Choose one of the following textbooks:

- På svenska:
A. Asratian, A. Björn, B. O. Turesson, *Diskret matematik*, Liber, 2020.
- In English:
K. H. Rosen, *Discrete Mathematics and its Applications*, 8th ed., McGraw-Hill, 2019.

All recommended exercises are taken from *Exercises in Discrete Mathematics* which is freely available from the course webpage.

Examination

The course is examined by one written exam (TEN1) comprised of eight problems. Problems 1–3 are worth one point each. Problems 4–8 are worth three points each. In order to receive grade 3/4/5, it is required to obtain 9/12/15 points.

During the course, three non-mandatory digital exams (KTR1–3) are given. Passing all three gives one bonus point to add to the total exam score (on all future exams, until further notice). Passing less than three gives no bonus. The digital exams are taken at home on your own electronic device. Consult the course webpage for detailed instructions.

Language

The course is given in English unless everyone who is present understands Swedish. The written exam (TEN1) will be available both in Swedish and in English. Questions from students are welcome in either language at all times.

Teaching

Fourteen lectures are offered. The last one is devoted to review before the exam. The other thirteen are followed by one exercise session each. The lectures cover a selection of the material; be prepared to read the rest on your own. The exercise sessions are mainly for your own work with the recommended exercises. The time available is most likely not going to be enough for you to be able to solve all of them. Work at home, if possible before class, in order to collect questions so that you can make the most out of the time spent in the classroom.

Planning

On the next page, you find a detailed plan for the lectures as well as recommended exercises for the exercise sessions and your individual studies.

Program 2026

Part I, lectures 1–5. Material for KTR1.		
Lec 1	Introduction, sets, induction Exercises: P.1.1–5, P.2.1–8	ABT: 2.1–5, 4.1–3 Rosen: 2.1–2, 2.5, 5.1–2
Lec 2	Recursive definitions, recurrence relations Exercises: P.2.9–20	ABT: 4.4, 6.1–5 Rosen: 5.3, 8.1–2
Lec 3	Combinatorics: sum and product rules, permutations, selections Exercises: P.3.1–13	ABT: 5.1–5, 5.7–8 Rosen: 6.1, 6.3–4
Lec 4	Combinatorics: multinomial coefficients, multiset selections Exercises: P.3.14–23	ABT: 5.6, 5.9 Rosen: 6.5
Lec 5	Combinatorics: pigeonhole principle, inclusion-exclusion Exercises: P.3.24–33	ABT: 5.10–13 Rosen: 6.2, 8.5–6

Part II, lectures 6–10. Material for KTR2.		
Lec 6	Number theory: Euclid’s algorithm, diophantine equations Exercises: P.4.1–15	ABT: 7.1–8 Rosen: 4.1, 4.3–4
Lec 7	Relations: equivalence relations, partial orders Exercises: P.5.1–11	ABT: 8.1–4 Rosen: 9.1, 9.3–6
Lec 8	Posets, Hasse diagrams, lattices Exercises: P.5.12–21	ABT: 13.1–4 Rosen: 9.6
Lec 9	Number theory: modular arithmetic, Chinese remainder theorem Exercises: P.6.1–11	ABT: 9.1–4 Rosen: 4.1, 4.3–4
Lec 10	Number theory: Fermat’s little theorem, cryptography, RSA Exercises: P.6.12–19	ABT: 9.5–6 Rosen: 4.4, 4.6

Part III, lectures 11–13. Material for KTR3.		
Lec 11	Graphs: basics, Hamilton, Euler, isomorphisms Exercises: P.7.1–16	ABT: 10.1–4 Rosen: 10.1–5
Lec 12	Graphs: trees and forests, bipartiteness, planarity Exercises: P.7.17–26	ABT: 10.5, 11.1–2, 12.1 Rosen: 10.2, 10.7, 11.1–4
Lec 13	Graphs: planar graphs, chromatic numbers and polynomials Exercises: P.7.27–39	ABT: 12.1–4 Rosen: 10.7–8 + handout

Lec 14	Course review	all of the above
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