Course Syllabus

Discrete Mathematics, Fall 2025

Konstantin Chukharev

Discrete Mathematics

"Mathematics is not about numbers, equations, computations, or algorithms: it is about understanding."

— William Paul Thurston

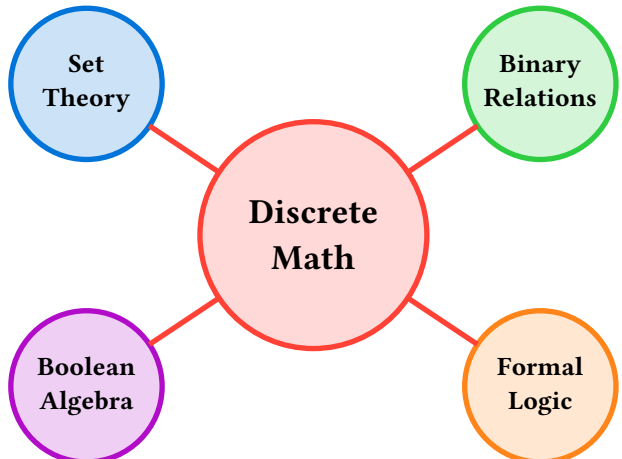
Course Overview

Course information

- **Title:** Discrete Mathematics
- **Semester:** Fall 2025
- **Prerequisites:** High school math
- **Language:** Russian + English
- **Format:** Lectures, assignments, exam

What you'll master

- Mathematical structures & reasoning
- Discrete (vs continuous) mathematics
- Proof construction & validation
- CS foundations & applications



Learning Journey: From Foundations to Mastery

Core skills you'll develop

1. Work confidently with sets, relations, functions, logic, proofs
2. Design Boolean circuits
3. Construct mathematical proofs
4. Apply discrete math to CS problems

Why this matters?

- Foundation for computer science
- Critical thinking & logical reasoning
- Problem-solving methodology
- Preparation for advanced courses
- Real-world applications

The Four Pillars of Discrete Mathematics

Set Theory

- Basic operations & notation
- Power sets & cardinality
- Russell's paradox

Applications: *Database design, data structures, algorithm analysis.*

Binary Relations

- Relation properties
- Equivalence relations
- Functions as relations

Applications: *Database relations, sorting algorithms, object hierarchies.*

Boolean Algebra

- Boolean functions & truth tables
- Logic gates & circuits
- Circuit minimization

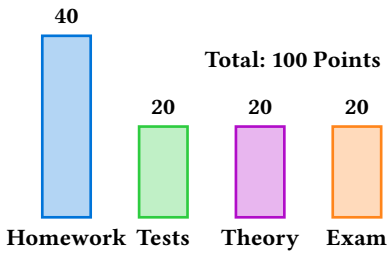
Applications: *Computer hardware, digital design, optimization.*

Formal Logic

- Propositional logic
- Natural deduction
- Predicate logic intro

Applications: *Program verification, AI reasoning, formal methods.*

Assessment: Your Path to Success



Homework

- 4 assignments, 10 points each
- Computational and proof problems
- Collaboration allowed
- Oral defense required
- Late submissions penalized
- Partial solutions are not accepted

Critical Requirements

- Both theoretical minimums and *all* homeworks must be completed
- Academic integrity enforced

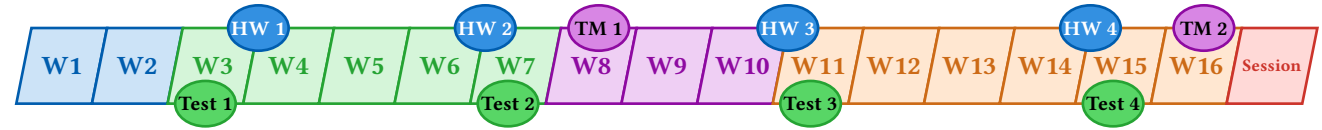
Tests & Exams

- *Module tests:* Computational tasks
- *Theoretical minimums:* Oral questionnaire
- *Final Exam:* Written + Verbal + Practical

Grading Scale

Grade	Points	Description
5	91–100	Excellent
4	74–90	Good
3	60–73	Pass
F	< 60	Fail

Course Timeline: 16+ Weeks of Mathematical Adventure



Nearest Milestones

- **Week 3:** Module 1 Test
- **Week 4:** First Homework due
- **Week 8:** Theoretical Minimum 1

Keep track of announcements!

Study Strategy

- Start homework early!
- Form study groups for collaboration
- Attend office hours for help
- Read the textbook alongside lectures

Resources & Materials

Course Materials

- **Primary:** Lecture notes
- **Reference:** Kenneth Rosen's textbook
- **Website:** https://github.com/Lipen/discrete-math-course

Academic Integrity

- Homework: collaboration allowed
- Tests/Exams: individual work only
- Plagiarism = automatic failure
- When in doubt, ask!

Additional Resources

- Online tutorials and videos
- Practice problem sets
- Mathematical proof guides
- LaTeX formatting help
- GitHub course repository

Submission Guidelines

- PDF format only (no exceptions)
- Include name, group, ISU ID
- Submit before deadline (23:55 GMT+3)
- Use Dropbox submission links
- Late submissions are punished

You're Not Alone!

🤝 Getting Help

- Instructor office hours: [TBA]
- Teaching assistant hours: [TBA]
- Telegram chat for Q&A: [TBA]
- Study groups encouraged!
- GitHub for course feedback

💪 Success Strategies

- Work steadily, don't cram
- Do problems beyond homework
- Ask early and often
- Regularly review the concepts
- Mathematical maturity takes time!

👥 Study Community

- Form study groups with classmates
- Discuss problems
- Share learning strategies
- Help each other understand concepts
- Celebrate successes together

🎯 Learning Tips

- Attend every lecture
- Start homework assignments early
- Practice writing clear explanations
- Don't just memorize — understand!

Questions?

"The important thing is not to stop questioning."

— Albert Einstein