# **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

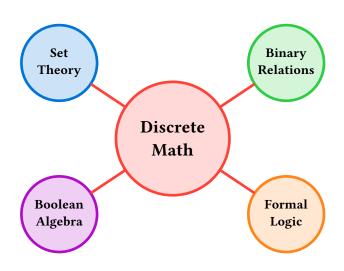
• Language: Russian + English

• Format: Lectures, assignments, exam

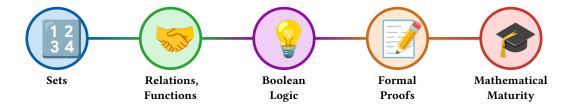


### What you'll master

- 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.* 

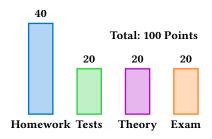


### Formal Logic

- 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



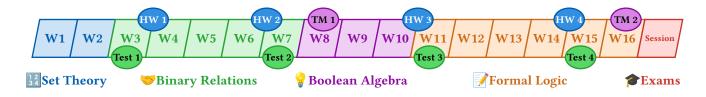
#### **Tests & Exams**

- 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: <a href="https://github.com/Lipen/discrete-math-course">https://github.com/Lipen/discrete-math-course</a>



## **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