

# Course Syllabus

**Discrete Mathematics, Fall 2025**

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# Discrete Mathematics

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*“Mathematics is not about numbers, equations, computations, or algorithms:  
it is about understanding.”*

*— William Paul Thurston*

# Course Overview



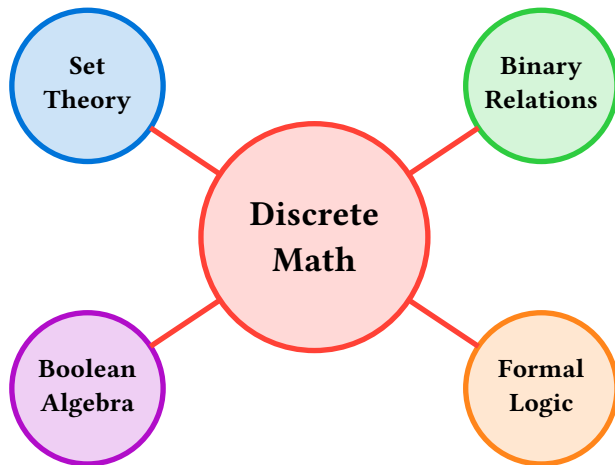
## Course information

- **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



Sets



Relations,  
Functions



Boolean  
Logic



Formal  
Proofs



Mathematical  
Maturity



## 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.*

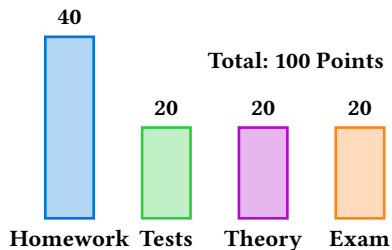


## Formal Logic

- 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



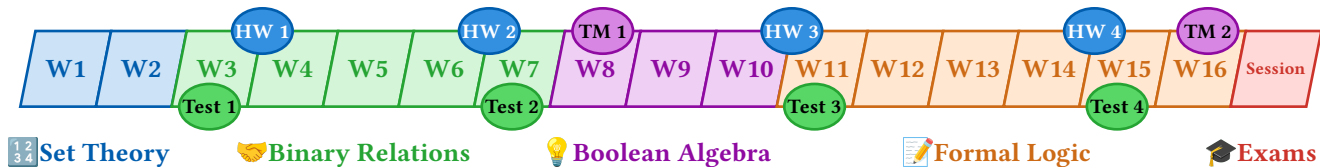
## Tests & Exams

- *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?

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*“The important thing is not to stop questioning.”*

*— Albert Einstein*