

# ECE 312 Discrete Mathematics

## COURSE INSTRUCTOR AND CONTACT INFORMATION

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## COURSE TEACHING ASSISTANT AND CONTACT INFORMATION

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- **Office:** CoRE 501

## COURSE MEETING DAYS, TIMES, LOCATION, MODALITY

**Course time:** 12:10 PM – 13:30 PM, Monday/Thursday

**Course location:** Richard Weeks Hall 105 (click [here \[hyperlink\]](#) to see the location) of Busch campus

**Canvas sites:**

- Undergraduate students: <https://rutgers.instructure.com/courses/267230>

**Course format:** **In-person class**. See attendance and participation for more policies.

## OFFICE HOURS / STUDENT SUPPORT HOURS

Professor Office hours: 11 AM – 12 PM Monday/Thursday, or by appointment via email.

Location (either one below would work):

- Virtual office hour on zoom:  
<https://rutgers.zoom.us/my/hl1097?pwd=RVNmY0ZxVXRmWjd6QzREaGZoZkVqdz09>, passcode: hl1097
- In person: CoRE 509, Busch campus

Teaching Assistant Office hours: 2 PM – 3 PM Monday, or by appointment via email.

Location:

- In person: CoRE 501, Busch campus

## COURSE DESCRIPTION

Discrete mathematics is a fundamental course for computer and electrical engineering. In this course, we will be covering the topics of logic and proofs, basic mathematic structures,



algorithms, number theory and cryptography, induction and recursion, counting, and discrete probability.

**Prerequisites:** 14:332:226 Probability and Random Process; 14:332:231 Digital Logic Design

## REQUIRED TEXTS AND COURSE MATERIALS

Discrete Mathematics and Its Applications, Kenneth H. Rosen, 8<sup>th</sup> edition.

## LEARNING GOALS

After successfully completing this course, the students will be able to learn:

- Mathematical Reasoning: Ability to read, understand, and construct mathematical arguments and proofs.
- Combinatorial Analysis: Techniques for counting objects of different kinds.
- Discrete Structures: Abstract mathematical structures that represent objects and the relationships between them.
- Algorithmic Thinking: An algorithm is a sequence of steps that can be followed to solve any instance of a particular problem. Algorithmic thinking involves specifying algorithms, analyzing the memory and time required by an execution of the algorithm, and verifying that the algorithm will produce the correct answer.
- Applications and Modeling: Concepts from discrete mathematics have not only been used to address problems in computing, but have been applied to solve problems in many areas such as chemistry, biology, linguistics, geography, business, etc.

## GRADING SCALE

We will follow the default grading scale from Canvas  
(<https://rutgers.instructure.com/courses/267230>)

## ASSESSMENT / GRADING COMPONENTS

### Weighting of Assessments

#### **Participation: 10%**

The students should attend the course and participate in the discussion of the papers presented by their peers.

#### **Homework 40%**

**We will have seven (7) homework during this course.** The homework will be posted and submitted through CANVAS. Please start your homework early to avoid delays in submission.

**Midterm Exam: 25%**

The midterm exam will take 1 hour and 20 minutes. The exam will be hosted in the classroom.

**Final Exam: 25%**

The final exam will take 1 hour and 20 minutes. The exam will be hosted in the classroom.

**Late submission policy:** All assignments are due on Canvas by class 12:10 PM Monday/Thursday. Each delayed day of the submission will introduce a 20%-point penalty. That said, after 5 days of delays, there is no need for submissions.

**TENTATIVE SCHEDULE OF TOPICS**

Week	Time	Subject	Section	Note
1	Jan 18	Syllabus		
2	Jan 22	Propositional Logic	Ch 1.1	Hw 1 out
	Jan 25	Applications of Propositional Logic	Ch 1.2, 1.3	
3	Jan 29	Predicate Logic	Ch 1.4	
	Feb 1	Nested Quantifiers	Ch 1.5	
4	Feb 5	Rules of Inference	Ch 1.6	
	Feb 8	Proofs	Ch 1.7, 1.8	Hw 1 due
5	Feb 12	Sets and Set Operations	Ch 2.1, 2.2	Hw 2 out
	Feb 15	Functions	Ch 2.3	
6	Feb 19	Sequences and Summations	Ch 2.4	
	Feb 22	Cardinality of Sets and Matrices	Ch 2.5, 2.6	
7	Feb 26	Algorithms	Ch 3.1	Hw 2 due, Hw 3 out
	Feb 29	The Growth of Functions	Ch 3.2	
8	Mar 4	Complexity of Algorithms	Ch 3.3	
	Mar 7	Recitation 1	HW 1,2	
9	Mar 11	Spring Recess (No Class, Have a good rest)		
	Mar 14	Spring Recess (No Class, Have a good rest)		
10	Mar 18	Divisibility and Modular Arithmetic, Integer Representations and Algorithms	Ch 4.1, 4.2	Hw 3 due, Hw 4 out
	Mar 21	Primes and Greatest Common Divisors	Ch 4.3	
11	Mar 25	Solving Congruences	Ch 4.4	

	Mar 28	Midterm (Thursday)		
12	April 1	Congruences Applications & Cryptography	Ch 4.5 & 4.6	Hw 4 due, Hw 5 out
	April 4	Recitation 2: Midterm review (Monday)	HW 3,4	
13	April 8	Mathematical Induction, Strong Induction and Well-Ordering	Ch 5.1,5.2	
	April 11	Recursive Definitions and Structural Induction	Ch 5.3	
14	April 15	Recursive Algorithms	Ch 5.4	
	April 18	The Basics of Counting, The Pigeonhole Principle	Ch 6.1,6.2	Hw 5 due, Hw 6 out
15	April 22	Permutations and Combinations, Binomial Coefficients and Identities	Ch 6.3,6.4	
	April 25	Generalized Permutations and Combinations	Ch 6.5	
16	April 29	Review & Recitation 3	HW 5-6	Hw 6 due
	May 2	Final exam <b>[LOCATION: ROOM BME 102]</b>		

## POLICIES

### Attendance and Participation

Per GRADING COMPONENTS, attendance and participation will be 10% in your total grade. While we encourage our students to attend the class and or participate in the discussion, the student should not risk his/her health to fulfill this goal. More information about attendance and participation can be found <https://sasundergrad.rutgers.edu/degree-requirements/policies/attendance-and-cancellation-of-classes>.

### Disability Accommodations

In order to receive consideration for reasonable accommodations, a student with a disability must contact the appropriate disability services office at the campus where you are officially enrolled, participate in an intake interview, and provide documentation.” Please see <https://ods.rutgers.edu/> or reach out to the instructor for more information.

## CIVILITY / COMMUNICATION / CLASSROOM COMMUNITY / SENSITIVE TOPICS

This course is purely based on presentation and discussion. So, **the instructor would like to encourage a respectful communication and supportive classroom community that celebrates diversity.** For the presentation, we want the presenters and participants to be aware of sensitive and uncomfortable topics, language or image.

## ACADEMIC INTEGRITY POLICY

Rutgers University takes academic dishonesty very seriously. By enrolling in this course, you assume responsibility for familiarizing yourself with the Academic Integrity Policy and the possible penalties (including suspension and expulsion) for violating the policy. As per the policy, all suspected violations will be reported to the Office of Student Conduct. Academic dishonesty includes (but is not limited to):

- Cheating
- Plagiarism
- Aiding others in committing a violation or allowing others to use your work
- Failure to cite sources correctly
- Fabrication
- Using another person's ideas or words without attribution, including re-using a previous assignment
- Unauthorized collaboration
- Sabotaging another student's work

If you are ever in doubt, consult your instructor.

If you have any questions, please visit the Rutgers University website on Academic Integrity:  
<http://nbacademicintegrity.rutgers.edu/>

## **STUDENT SUPPORT AND MENTAL WELLNESS**

Rutgers University provides the following resources to support students in their academic success and mental wellness.

- Student Success Essentials: <https://success.rutgers.edu>
- Student Support Services: <https://www.rutgers.edu/academics/student-support>
- The Learning Centers: <https://rlc.rutgers.edu/>
- Rutgers Libraries: <https://www.libraries.rutgers.edu/>
- Bias Incident Reporting: <https://studentaffairs.rutgers.edu/bias-incident-reporting>
- Office of Veteran and Military Programs and Services: <https://veterans.rutgers.edu>
- Student Health Services: <http://health.rutgers.edu/>
- Counseling, Alcohol and Other Drug Assistance Program & Psychiatric Services (CAPS): <http://health.rutgers.edu/medical-counseling-services/counseling/>
- Office for Violence Prevention and Victim Assistance: [www.vpva.rutgers.edu/](http://www.vpva.rutgers.edu/)