

COM 5001: Computer Science Math I

Prof. Iddo Drori, Fall 2025

Description

Many concepts and theories in modern computer science are built on discrete mathematics, linear algebra, and calculus. This course introduces students to fundamental mathematics for computer science, including topics such as number theory, combinatorics, graph theory, differential, integral and vector calculus for functions of more than one variable as well as basics of linear algebra. By the end of this course, students will be able to: (i) Describe and explain fundamental concepts and theories from discrete mathematics, calculus, multivariable calculus, and linear algebra; (ii) Apply mathematical methods to real-world problems; (iii) Identify and apply mathematical reasoning and proofs relevant to computing.

Level. Graduate class, 3 credits, core degree requirement.

Activities. The course includes quizzes, written assignments, programming projects, two midterms, and a comprehensive final exam. Evaluation will feature short-answer, multiple-choice, true/false, and programming tasks. Projects will integrate course concepts through problem-solving, research, and coding exercises.

Textbooks.

- Calculus, Gilbert Strang, Wellesley-Cambridge Press
- Linear Algebra, Gilbert Strang, Wellesley-Cambridge Press

Schedule. Class meets Mondays between 7:45-9:45pm.

Lectures

- First day of classes (Monday, August 25)
- Lecture 1 (Monday, August 25): Algebraic structures: Groups, Rings, Fields, and Graphs, etc.
- Labor Day (Monday, September 1): University holiday, no classes held
- Lecture 2 (Monday, September 8): Number Theory
- Lecture 3 (Monday, September 15): Combinatorics
- Lecture 4 (Monday, September 29): Derivatives, Chain Rule
- Rosh Hashanah Eve (Monday, September 22): No classes after 1pm.
Rosh Hashanah (Tuesday, September 23 - Wednesday, September 24): No classes, University closed.
- Lecture 5 (Monday, October 20): Integrals
- Yom Kippur Eve (Wednesday, October 1): No classes after 1pm.
Yom Kippur (Thursday, October 2): No classes, University closed.
- Sukkot Eve (Monday, October 6): Sukkot Eve, no classes after 1pm.
Sukkot (Tuesday, October 7 - Wednesday, October 8): No classes, University closed.
- Shemini Atzeret Eve (Monday, October 13): No classes after 1pm.
Shemini Atzeret and Simchat Torah (Tuesday, October 14 - Wednesday, October 15): No classes, University closed.
- Lecture 6 (Monday, October 27): Exponentials and Logarithms
- Lecture 7 (Monday, November 3): Polar Coordinates and Complex Numbers
- Lecture 8 (Monday, November 10): Infinite Series
- Lecture 9 (Monday, November 17): Vectors, Vector Spaces and Subspaces, and Matrices
- Lecture 10 (Monday, November 24): Orthogonality, Determinants
- Lecture 11 (Monday, December 1): Eigenvalues and Eigenvectors, Singular Value Decomposition
- Thanksgiving (Thursday, November 27 - Friday, November 28): No classes, University closed.
- Lecture 12 (Monday, December 8): Linear Transformation
- Lecture 13 (Monday, December 15): Partial Derivatives
- Lecture 14 (Monday, December 22): Double Integrals and Line Integrals in the Plane, Triple Integrals and Surface Integrals in 3-Space
- Last day of classes (Tuesday, December 23)