

Syllabus



CS 135: Discrete Structures

SES

Spring 2021

Instructor: Sandeep Bhatt

Meeting Times: MWF 10-10:50am (A) and 11-11:50 (B)

Classroom Location:

Contact Info: sandeep.bhatt@stevens.edu

Office Hours:

Prerequisite(s):

Corequisite(s):

Cross-listed with:

COURSE DESCRIPTION

Introduction to topics in discrete mathematics, including logic, sets, relations and functions, proofs by induction, recursive programs, graph theory, elementary number theory and elementary combinatorics. The emphasis is on logical reasoning, clear presentation of proofs, and applications to problems in computing.

STUDENT LEARNING OUTCOMES

After successful completion of this course, students will be able to...

Formal logic – Prove validity of propositional formulas using truth

tables, laws of logic, and the tree method.

Sets, Functions and Relations – Prove set identities using set-builder notation and laws of propositional logic. Prove basic properties of functions (injective, surjective, bijective) and relations (reflexive, commutative, transitive) using logical reasoning.

Induction – Use inductive reasoning to solve problems and to prove properties of discrete structures and recursive programs.

Scheme - Implement recursive functions over lists, relations, and numbers.

Number Theory – Define and prove properties such as primality and relative primality. Implement Euclid's algorithm to calculate gcds.

Modular Arithmetic – Define and prove properties of modular arithmetic, including Chinese Remaindering and Fermat's Little Theorem. Apply the theory to design and evaluate private- and public-key cryptographic systems.

Graphs – Prove basic properties of trees, Eulerian cycles, and planar graphs.

COURSE FORMAT AND STRUCTURE

TENTATIVE COURSE SCHEDULE

Week 1: Logical propositions, connectives and truth tables

Week 2: Propositional logic: logical inference techniques

Week 3: Predicate logic, Sets

Week 4: Relations and Functions

Week 5: Functions and Countability

Week 6: Induction

Week 7: Graphs: Trees, Eulerian Cycles

Week 8: Graphs: Planar graphs, Map coloring

Week 9: Graphs: Stable Matchings, Hall's Theorem

Week 10: Number Theory: GCD, Linear Combinations

Week 11: Number Theory: Modular Arithmetic, Chinese Remaindering

Week 12: Applications to Cryptography

Week 13: Counting: Sum and product rules, inclusion-exclusion principle

Week 14: Combinatorial reasoning, Review

COURSE MATERIALS

Textbook(s): Online textbook titled "Discrete Mathematics," at zybooks.com

COURSE REQUIREMENTS

- Attendance in lectures and labs is mandatory
- Class participation grades will be assigned based on level of engagement in lectures, labs and office hours.
- Online reading assignments and deadlines will be posted in the online text.
- Weekly problem sets and deadlines will be posted on Canvas. Submissions must be pdf files, and students are responsible for checking that the uploaded submissions are complete.
- You will be offered a makeup mini-quiz or quiz only if you had prior approval to miss the quiz at the scheduled time.

GRADING PROCEDURES

Grades will be based on:

Class Participation	5%
Mini Quizzes	15%
Problem Sets	20%
Online Reading	10%
Labs	20%
Quizzes	30%

Late Policy: Without prior permission from the instructor:

- No credit for late online reading assignments
- For homework submissions the late penalty is as follows:
 - less than 10 minutes late: subtract 10%
 - 10-30 minutes late: subtract 25%
 - 30-60 minutes late: subtract 50%
 - more than 60 minutes late: no credit
- Any question concerning a grade must be brought up with a CA or instructor within one week of the grade being issued.

ACADEMIC INTEGRITY

Undergraduate Honor System

Enrollment into the undergraduate class of Stevens Institute of Technology signifies a student's commitment to the Honor System. Accordingly, the provisions of the Stevens Honor System apply to all undergraduate students in coursework and Honor Board proceedings. It is the responsibility of each student to become acquainted with and to uphold the ideals set forth in the Honor System Constitution. More information about the Honor System including the constitution, bylaws, investigative procedures, and the penalty matrix can be found online at

<http://web.stevens.edu/honor/> [\(http://web.stevens.edu/honor/\)](http://web.stevens.edu/honor/)

The following pledge shall be written in full and signed by every student on all submitted work (including, but not limited to, homework, projects, lab reports, code, quizzes and exams) that is assigned by the course instructor. No work shall be graded unless the pledge is written in full and signed.

"I pledge my honor that I have abided by the Stevens Honor System."

Reporting Honor System Violations

Students who believe a violation of the Honor System has been committed should report it within ten business days of the suspected violation. Students have the option to remain anonymous and can report violations online at www.stevens.edu/honor [\(http://www.stevens.edu/honor/\)](http://www.stevens.edu/honor/).

Graduate Student Code of Academic Integrity

All Stevens graduate students promise to be fully truthful and avoid dishonesty, fraud, misrepresentation, and deceit of any type in relation to their academic work. A student's submission of work for academic credit indicates that the work is the student's own. All outside assistance must be acknowledged. Any student who violates this code or who knowingly assists another student in violating this code shall be subject to discipline.

All graduate students are bound to the Graduate Student Code of Academic Integrity by enrollment in graduate coursework at Stevens. It is the responsibility of each graduate student to understand and adhere to the Graduate Student Code of Academic Integrity. More information including types of violations, the process for handling perceived violations, and types of sanctions can be found at www.stevens.edu/provost/graduate-academics [_ \(http://www.stevens.edu/provost/graduate-academics\)](http://www.stevens.edu/provost/graduate-academics).

Special Provisions for Undergraduate Students in 500-level Courses

The general provisions of the Stevens Honor System do not apply fully to graduate courses, 500 level or otherwise. Any student who wishes to report an undergraduate for a violation in a 500-level course shall submit the report to the Honor Board following the protocol for undergraduate courses, and an investigation will be conducted following the same process for an appeal on false accusation described in Section 8.04 of the Bylaws of the Honor System. Any student who wishes to report a graduate student may submit the report to the Dean of Graduate Academics or to the Honor Board, who will refer the report to the Dean. The Honor Board Chairman will give the Dean of Graduate Academics weekly updates on the progress of any casework relating to 500-level courses. For more information about the scope, penalties, and procedures pertaining to undergraduate students in 500-level courses, see Section 9 of the Bylaws of the Honor System document, located on the Honor Board website.

EXAM ROOM CONDITIONS

The following procedures apply to quizzes and exams for this course. As the instructor, I reserve the right to modify any conditions set forth below by printing revised Exam Room Conditions on the quiz or exam.

1. Students may use the following devices during quizzes and/or exams. Any electronic devices that are not mentioned in the list below are not permitted. Students may not collaborate either directly or indirectly via a web server.

Device	Permitted?	
	Yes	No
Laptops	Yes	
Cell Phones	Yes	

Tablets	Yes	
Smart Watches	Yes	
Google Glass	Yes	
Other		NO

2. Students may use the following materials during quizzes and/or exams. Any materials that are not mentioned in the list below are not permitted.

Material	Permitted?	
	Yes	No
Handwritten Notes <i>Conditions:</i>	Yes	
Typed Notes <i>Conditions:</i>	Yes	
Textbooks <i>Conditions:</i>	Yes	
Readings <i>Conditions:</i>	Yes	
Other		NO

3. Students **are not** allowed to work with or communicate with other students during quizzes and/or exams.

Specific Parameters:

LEARNING ACCOMODATIONS

Stevens Institute of Technology is dedicated to providing appropriate accommodations to students with documented disabilities. The Office of Disability Services (ODS) works with undergraduate and graduate students with learning disabilities, attention deficit-hyperactivity disorders, physical disabilities, sensory impairments, psychiatric disorders, and other such disabilities in order to help students achieve their academic and personal potential. They facilitate equal access to the educational programs and opportunities offered at Stevens and coordinate reasonable accommodations for eligible students. These services are designed to encourage independence and self-advocacy with support from the ODS staff. The ODS staff will facilitate the provision of accommodations on a case-by-case basis.

Disability Services Confidentiality Policy

Student Disability Files are kept separate from academic files and are stored in a secure location within the Office of Disability Services. The Family Educational Rights Privacy Act (FERPA, 20 U.S.C. 1232g; 34CFR, Part 99) regulates disclosure of disability documentation and records maintained by Stevens Disability Services. According to this act, prior written consent by the student is required before our Disability Services office may release disability documentation or records to anyone. An exception is made in unusual circumstances, such as the case of health and safety emergencies.

For more information about Disability Services and the process to receive accommodations, visit <https://www.stevens.edu/office-disability-services>. If you have any questions please contact: Phillip Gehman, the Director of Disability Services Coordinator at Stevens Institute of Technology at pgehman@stevens.edu or by phone (201) 216-3748.

INCLUSIVITY

Name and Pronoun Usage

As this course includes group work and in-class discussion, it is vitally important for us to create an educational environment of inclusion and mutual respect. This includes the ability for all students to have their chosen gender pronoun(s) and chosen name affirmed. If the class roster does not align with your name and/or pronouns, please inform the instructor of the necessary changes.

Inclusion Statement

Stevens Institute of Technology believes that diversity and inclusiveness are essential to excellence in academic discourse and innovation. In this class, the perspective of people of all races, ethnicities, gender expressions and gender identities, religions, sexual orientations, disabilities, socioeconomic backgrounds, and nationalities will be respected and viewed as a resource and benefit throughout the semester. Suggestions to further diversify class materials and assignments are encouraged. If any

course meetings conflict with your religious events, please do not hesitate to reach out to your instructor to make alternative arrangements.

You are expected to treat your instructor and all other participants in the course with courtesy and respect. Disrespectful conduct and harassing statements will not be tolerated and may result in disciplinary actions.

MENTAL HEALTH RESOURCES

Part of being successful in the classroom involves a focus on your whole self, including your mental health. While you are at Stevens, there are many resources to promote and support mental health. The Office of Counseling and Psychological Services (CAPS) offers free and confidential services to all enrolled students who are struggling to cope with personal issues (e.g., difficulty adjusting to college or trouble managing stress) or psychological difficulties (e.g., anxiety and depression). Appointments are strongly encouraged and can be made by phone (201-216-5177) or in-person (on the 7th floor of the Howe Center). CAPS is open from 9:00 am – 5:00 pm Mondays, Wednesdays, Thursdays and Fridays and from 9:00 am – 7:00 pm on Tuesdays during the Fall and Spring semesters.

EMERGENCY INFORMATION

In the event of an urgent or emergent concern about the safety of yourself or someone else in the Stevens community, please immediately call the Stevens Campus Police at 201-216-5105 or on their emergency line at 201-216-3911. These phone lines are staffed 24/7, year round. Other 24/7 resources for students dealing with mental health crises include the National Suicide Prevention Lifeline (1-800-273-8255) and the Crisis Text Line (text “Home” to 741-741). If you are concerned about the wellbeing of another Stevens student, and the matter is *not* urgent or time sensitive, please email the CARE Team at care@stevens.edu (<mailto:care@stevens.edu>). A member of the CARE Team will respond to your concern as soon as possible.