New Paltz
STATE UNIVERSITY OF NEW YORK

COMPUTER SCIENCE

CPS593 – Discrete Structures

Course Details:

Course Designation: Graduate
Course Type: Lecture/Lab
Mee-ng Times: Wednesdays 5:00pm – 7:50pm
Loca-on: HUM 218
Credit Hours: 3

Instructor: Walter Manrique

e-mail: manriquw@newpaltz.edu
Phones: 914-269-8678
Office Hours: By appointment only

Course Details:

This course is a rigorous introduction to the mathematical structures that form the core of many computer science concepts. The term *discrete* refers to the fact that the entities dealt with are discrete, not continuous, as is the case in calculus-based mathematical structures used in modeling many natural phenomena. These concepts give you the theoretical framework to understand algorithms and data structures at the core of computing. These structures are necessary to understand fields such as machine learning, AI and cryptography.

The main concepts covered in the course include:

- Basic structures: sets, functions and relations, Cartesian products
- Combinatorics: Counting, permutations, combinations, partitions of sets
- Logic: Propositions and logical operators, equivalence and implications, quantifiers.
- Proofs: Method of proofs for sets, proving laws of set theory, induction, proof by induction
- Recursion and Recurrence relations: Many faces of recursion, recurrence relations, generating functions
- Matrix Algebra: Introduction to matrices, matrix operations, laws of matrix algebra

Student Learning Objectives:

On successful completion of the course, students will be practiced in using mathematical concepts and techniques to solve problems, and in expressing mathematical notions precisely. They will be able to use proofs by induction and understand the concept of recurrence. They will be able to use ideas and techniques from discrete mathematics in subsequent courses in computer science, in particular courses in the design and analysis of algorithms, networks, cryptography, so\ware engineering, data analysis, and machine learning.

Pre/Co-requisites: PI

Text Book:

Required Textbook: None.

Any good Discrete Structures Book will be good. I will provide supplemental notes as necessary. Below are some good references, starting with free books.

Recommended reference books:

Applied Discrete Structures (free online book) by Alan Doerr, Kenneth Levasseur, hcps://open.umn.edu/opentextbooks/textbooks/160

(*I will follow this book closely*)

Connecting Discrete Mathematics and Computer Science by David Liben-Nowell

Free online pre-publication versions at hcps://cs.carleton.edu/faculty/dlibenno/book/

Discrete Mathematics & its applications, Kenneth Rosen, 7th Edition

ISBN: 978-0-07-338309-5

Mathematics, A Discrete Introduction: 3rd ed., Edward R. Scheinerman

Other Resources:

I will make relevant resources available to you at the Brightspace course site. All course material, including Course Calendar, Syllabus, assignments, and tests will be posted on Brightspace.

Homework:

Homework will be posted on the course web site. In general, the homework does not need to be submitted, and the homework will not be graded. However, I will post solutions, and we will discuss them in class. The tests will be based on these homework exercises. *Occasionally, I may ask you to submit some homework to see your progress and to give feedback.*

Tentative Course Schedule:

08/27	Ch1: Set Theory	1.1, 1.2, 1.3
09/03	Ch2: Combinatorics	1.5, 2.1, 2.2
09/10	Ch2: Combinatorics	2.2, 3.1
09/17	Ch3: Logic	3.2, 3.3, 3.4, 3.5
09/24	Ch3: Logic	3.5
10/01		Midterm
10/08	Ch3: Logic	3.6, 3.7
10/15	Ch3: Logic	3.8
10/22	Ch6: Relations	6.1.4, 6.3.4, 7.1
10/29	Ch8: Recursion and Recurrence Relations	8.1, 8.2
11/05	Ch8: Recursion and Recurrence Relations	8.3, 8.5
11/12	Ch8: Recursion and Recurrence Relations	8.4
11/19	Ch5: Introduction to Matrix Algebra	5.1, 5.2, 5.3
11/26	Thanksgiving Recess – No Class	
12/03	Ch7: Functions	7.1, 7.2, 7.3
12/10		Final

Tests:

Your grade will be based on two in-class tests, a midterm exam, and a final exam. The dates of the exams and the percentage each exam contributes to the total is given below:

Test 1 - September 17 (20%)
Midterm - October 1 (20%)
Test 2 - November 19 (20%)
Final – December 10 (5 PM - 7 PM) (30%)

Grading:

Final letter grades will be based on your total percentage score, according to the scale:

A	100 – 93	A-	92.9 – 90
B+	89.9 – 87.5	B	87.4 – 82.6
B-	82.5 – 80	C+	79.9 – 77.5
C	77.4 – 72.6	C-	72.5 – 70
D+	69.9 – 67.5	D	67.4 – 62.6
D-	62.5 – 60	F	Below 60

Please Note: Except for documented medical emergencies, there will be no makeup tests.

On plagiarism (or cheating):

All work in the class will have to be done individually, except when collaborative work is explicitly assigned. While you may be allowed to check references online, sharing of code or other work in any form will be considered plagiarism. *Copying and pas=ng work of any kind from other students or web resources is also considered plagiarism. You may be given a zero for the whole test if plagiarism is detected in even a single question.*

Attendance/Late arrival:

Attendance is expected, but not mandatory. If you miss a class, you need not inform me, just make it up from the Brightspace notes. You are, however, responsible for all that goes on in the classroom, present or not. Please come to class on time - it's intolerable if people trickle into class as a matter of routine.

Important Dates:

- Last day to withdraw from the course without getting a W in transcripts: Sep 7, 2025
- Course Withdrawal Date (last day to withdraw from the course without getting a failing grade): November 14, 2025
- For other important dates, see the Academic Calendar: https://webapps.newpaltz.edu/calendars/academic/202509/1

Academic Integrity Statement:

Please see www.newpaltz.edu/advising/policies_integrity.html.

SEI:

Towards the end of the course, you will get a chance to provide a "Student Evaluation of Instruction". Students are encouraged to complete this.

Reasonable accommodation of individuals with disabilities statement:

Students needing classroom and/or testing accommodations related to a disability should contact the Disability Resource Center (Student Union, Room 210, 845-257-3020) as close as possible to the beginning of the semester. The DRC will then provide students' instructors with an Accommodation Memo verifying the need for accommodations. Direct specific questions about services and accommodations to Deanna Knapp, Assistant Director (knappd@newpaltz.edu).

Veteran and Military Services statement:

The Office of Veteran and Military Services (OVMS) is committed to serving the needs of veterans, service members and their dependents during their transition from military life to student life. Student veterans, service members or their dependents who need assistance while attending SUNY New Paltz may refer to www.newpaltz.edu/veterans; call 845-257-3120, -3124 or -3074; or stop by the Student Union, Room 100 South.

Computer and network policies statement:

Users of SUNY-New Paltz computer resources and network facilities are required to comply with the institutional policies outlined in the Acceptable Uses and Privacy Policy (hcps://sites.newpaltz.edu/csc/policies/acceptable-uses-and-privacy-policy/).

Students are required to use the following as a reference throughout the semester.

- Free materials for reading and demonstrations are linked in Brightspace.