CS 441: DISCRETE STRUCTURES FOR COMPUTER SCIENCE

3 CREDIT HOURS - SPRING 2024

COURSE SYLLABUS

INSTRUCTOR

Prof. PhD. Nils Murrugarra-Llerena

CONTACT INFORMATION

Office: Sennott Square 5419
Email: nem177@pitt.edu
Website: https://nineil.github.io/courses/fall24_cs441/

CLASS MEETING

The class will be face-2-face.
[Section A] Mon/Wed: 1:00pm - 2:15pm @ SENSQ 5502
[Section B] Mon/Wed: 3:00pm - 4:15pm @ LAWRN 207

OFFICE HOURS

Tue/Wed: 9:00am - 11:00am @ SENSQ 5419
If current time does not work for you, please send me an email to schedule alternative office hours.

TEACHING ASSISTANTS

TBD
Office: TBD
Office Hours: TBD

CO-REQUISITES

MATH 0220 or 0230 or 0235 or 0140 or 0221 or 0231

COURSE DESCRIPTION

The purpose of this course is to understand and use (abstract) discrete structures that are backbones of computer science. In particular, this class is meant to introduce logic, proofs, sets, relations, functions, counting, and probability, with an emphasis on applications in computer science.

LEARNING RESOURCES

TEXTBOOKS

- Discrete Mathematics and its Applications, Eight Edition, by Kenneth H. Rosen. McGraw-Hill, 2018.

Online textbook resources available here.

CANVAS

Canvas is where course modules, assignments, grades, and announcements will reside.

LEARNING ACTIVITIES

READINGS (LEARNING)

Weekly reading assignments will be posted to Canvas. Students are highly recommended to read the assigned materials before coming to class.

HOMEWORK ASSIGNMENTS (LEARNING AND ASSESSMENT)

These assignments help students practice what they learned in.

EXAM (ASSESSMENT ONLY)

There will be two exams covering the topics of this course.

GRADING

Grading will be based on the following components:

- Exam 1: 30%
- Exam 2: 30%
- Homework: 20%
- Recitation exercises: 10%
- Lecture participation: 10%

POLICIES

Lecture attendance

Students are expected to attend all lectures, which frequently include material that is not directly taken from the text. If a student misses a lecture, they are still responsible for the material covered and are advised to acquire notes from a classmate.

Homework

Homework assignments generally cover the same topics as the previous recitation's exercises. Unless otherwise specified, homework is assigned on Wednesday and collected on Gradescope by **11:59 pm on the following Tuesday**. Homework submissions must be completed individually. High-level solution tactics for homework problems may be discussed, but detailed solutions should not be shared. Students may not review problem solutions from classmates, former students, or posted online.

Late submissions are not accepted. To ensure everyone understands the submission system and general expectations, Homework 1 will be graded but **will not** count toward your final grade. In addition, your lowest homework grade will be dropped to accommodate undocumented minor illness or personal conflict.

Graded homeworks will indicate where points were deducted and identify the high-level mistakes made. You are encouraged to review the relevant material, try the problem again,

attempt similar problems in the text, and/or attend office hours to discuss solutions. Solutions will not be distributed.

Recitation

Recitation exercises generally cover the topics of the preceding week's lectures. Exercises are distributed on Wednesday, and are collected on Gradescope by **11:59 pm on Saturday**. Recitation exercises may be solved collaboratively, but each student should write up and submit solutions that represent their individual understanding. They are graded primarily for completion (and thus recitation attendance is important for assessing your correctness). For recitation to be as effective as possible, you should attempt the exercises before recitation.

Late submissions are not accepted. To ensure everyone understands the submission system and general expectations, Recitation 1 will be graded but **will not** count toward your final grade. In addition, your lowest recitation grade will be dropped to accommodate undocumented minor illness or personal conflict.

Participation: Top Hat

Top Hat is our primary platform for in-class participation questions. It can be accessed via Canvas or via the Top Hat mobile app. Students will be added to the Top Hat section prior to Week 2. To ensure that you get credit for your participation, link your Canvas and Top Hat accounts by clicking "Top Hat" from our course Canvas page.

Questions are distributed on Wednesday or before, and are collected on TopHat by **11:59 pm on Friday**. Each question has two attempts.

Exams

There will be two in-class exams. The second exam is **not** cumulative and will not cover material from the first exam. *There will be no make-up exams unless you or a very close friend/relative is seriously ill!*, in which case the instructor must be informed of the emergency in advance of the missed exam with **valid documented justification**. Missing an exam under any other circumstances will result in a score of 0.

Late Assignments

All assignments specify a precise due date and time. **Late assignments will not be accepted.** Students must ensure they understand each assignment's submission procedure in advance of its deadline to ensure that submission difficulties do not cause an assignment to be rejected.

Regrading Policy

After evaluation grades are out, students have around 1 week to ask any questions or concerns about their current grade. This regarding deadline will be published in each assignment. Any inquiry after the deadline will be disregarded.

The goal of a grade appeal is to ensure a fair and consistent score. Thus, a score will not be adjusted on an issue of partial credit if the awarded points are consistent with the grading policy adopted for the class as a whole.

When appealing a grade, first contact the grader. For grades returned on electronic platforms that have a "regrade request" feature, follow its instructions; otherwise, contact the grader directly using email (CC'ing the instructor) or office hours. If the grader does not find any mistakes made in the assigned grade, and is unable to clarify adequately the reasons for any assessed penalties, directly contact the instructor describing why you feel the assignment was graded unfairly. The entire assignment may be re-graded by the instructor, so the score may increase, remain the same, or even decrease.

Email Policy

Please add prefix [CS 441] in email communications, and allow at most 24 hours for an email answer. Emails without this prefix may not be answered. There's no email communication over weekends.

I usually review emails Monday through Friday between 8:00 am – 9:00 am. If you don't receive a response in 24 hours, feel free to send me a friendly reminder.

Extra Credit

No extra credit is available beyond what is already specified above.

Collaboration Policy and Academic Honesty

You will do your work (exams and homework) individually and without the help of artificial intelligence systems (e.g. ChatGPT). The work you turn in must be your own work. You are allowed to discuss the assignments with your classmates, but do not look at solutions they might have written for the assignments. You are also **not** allowed to search for or generate code on the internet, use solutions posted online unless you are explicitly allowed to look at those. When in doubt about what you can or cannot use, ask the instructor! A first offense will cause you to get 0% credit on the assignment. A report will be filed with the school. A second offense will cause you to fail the class and receive disciplinary penalty. Please consult SCI's Academic Integrity Country and Pitt's Academic Integrity Guidelines.

Respectful Discussion

This course may include open discussion or other interactions among students. To allow all participants to express their viewpoints, all discussion must remain civilized and respectful, and participants must avoid comments and behaviors that disparage others. A student who feels their viewpoints are not being respected is encouraged to contact the instructor, who will work to correct the situation without revealing the student's specific concerns to the rest of the class. A student in this situation who does not feel comfortable contacting the instructor directly is encouraged to contact the TA, who will uphold the same degree of confidence in relaying the issue to the instructor.

Diversity and Inclusion

The University of Pittsburgh does not tolerate any form of discrimination, harassment, or retaliation based on disability, race, color, religion, national origin, ancestry, genetic information, marital status, familial status, sex, age, sexual orientation, veteran status or gender identity or other factors as stated in the University's Title IX policy. The University is committed to taking prompt action to end a hostile environment that interferes with the University's mission. For more information about policies, procedures, and practices, see here.

I ask that everyone in the class strive to help ensure that their classmates can learn in a supportive and respectful environment. If you witness any instances of the aforementioned issues, please contact the Title IX Coordinator by calling 412-648-7860, emailing titleixcoordinator@pitt.edu, or filing a report online. You may also choose to report this to a faculty/staff member; they are required to communicate this to the University's Office of Diversity and Inclusion. If you wish to maintain complete confidentiality, you may also contact the University Counseling Center at 412-648-7930.

Copyrighted Materials

All course material is subject to copyright, including notes, slides, assignments, exams, and solutions. Students are allowed to use the provided material only for personal use, and may not share the material with others, including posting the material on the Web or other file sharing venues.

Note on Disabilities

If you have a disability for which you are or may be requesting an accommodation, you are encouraged to contact both your instructor and Disability Resources and Services (DRS), 140 William Pitt Union, (412) 648-7890, drsrecep@pitt.edu, (412) 228-5347 for P3 ASL users, as early as possible in the term. DRS will verify your disability and determine reasonable accommodations for this course.

Note on Medical Conditions

If you have a medical condition which will prevent you from doing a certain assignment, you must inform the instructor of this **before** the deadline. You must then submit documentation of your condition within a week of the assignment deadline.

Statement on Classroom Recording

To ensure the free and open discussion of ideas, students may not record classroom lectures, discussion and/or activities without the advance written permission of the instructor, and any such recording properly approved in advance can be used solely for the student's own private use.

SCHEDULE

The following is a tentative high-level weekly schedule of this class; it is subject to change at any time. Always refer to Canvas for more details and due dates.

#	Week of	Topic
1	Aug 26	Course Introduction, and Propositional logic [Sec 1.1]
2	Sep 2	Propositional logic, logic puzzles, propositional equivalence [Sec 1.2 – 1.3]
3	Sep 9	Predicate and quantifiers [Sec 1.4], and Nested quantifiers [Sec 1.5]
4	Sep 16	Rules of Inference, formal proofs [Sec 1.6] and informal proofs [Sec 1.7]
5	Sep 23	More proof techniques, proof strategy [Sec 1.8], sets, set operations [Sec 2.1-2.2.1]
6	Sep 30	Set identities and proofs [Sec 2.2.2 – 2.2.4], functions [Sec 2.3]
7	Oct 7	Sequences and summations [Sec 2.4]
8	Oct 14	Exam 1 Review Exam 1
9	Oct 21	Cardinality of Infinite sets [Sec 2.5], algorithms and pseudocode [Sec 3.1]
10	Oct 28	Growth rate of functions [Sec 3.2], complexity of algorithms [Sec 3.3]
11	Nov 4	Divisibility, modular congruence [Sec 4.1], and integer representations [Sec 4.2]
12	Nov 11	Primality, GCDs [Sec 4.3], solving congruences, and Modular Inverses [Sec 4.4]
13	Nov 18	Applications of Modular congruence [Sec 4.5 – 4.6], and mathematical induction [Sec 5.1]
14	Nov 25	Strong Induction [Sec 5.2], recursion, and structural induction [Sec 5.3 - 5.4]
15	Dec 2	Exam 2 Review
16	Dec 9	Exam 2