

CS 1800 & CS 1802 Discrete Structures, Fall 2024

Oakland Campus, Northeastern University

CS 1800

Introduces the mathematical structures and methods that form the foundation of computer science. Studies structures such as sets, tuples, sequences, lists, trees, and graphs. Discusses functions, relations, ordering, and equivalence relations. Examines inductive and recursive definitions of structures and functions. Discusses principles of proof such as truth tables, inductive proof, and basic logic. Also covers the counting techniques and arguments needed to estimate the size of sets, the growth of functions, and the space-time complexity of algorithms.

CS 1802

Accompanies CS 1800. Illustrates topics from the lecture course through discussions, quizzes, and homework assignments.

Course Outcomes

- Interpret and create binary and hex representations of numbers
- Create, simplify, and evaluate logical formulas and circuits
- Perform calculations in modular arithmetic
- Apply set operations
- Solve basic combinatorics problems, including permutations and combinations
- Calculate probabilities
- Obtain familiarity with basic sorting and searching algorithms and their analysis
- Prove by induction
- Compare growth rates of functions
- Understand basic graph terminology
- Execute breadth-first and depth-first search graph algorithms

Instructors

Professor **Maryam Farahmand Asil** (she/her), m.farahmandasil@northeastern.edu

Professor **Miguel Fuentes-Cabrera** (he/him), m.fuentes-cabrera@northeastern.edu

Professor **Almudena Konrad** (she/her), a.konrad@northeastern.edu

Professor **Susan Wang** (she/her), su.wang@northeastern.edu

Please check the CS 1800 Canvas page for updated information on office hours.

Lectures and Recitations Schedule

CS1800

Section	Day & Time	CRN	Instructor	Room
10	MWF 3-4:05	20158	A. Konrad	CPM100
11	MWF 4:15-5:20	20159	A. Konrad	CPM100
12	MW 11:50-1:30	20160	M. Fuentes-Cabrera	Aron Art 120
13	TF 12:25-2:05	20161	S. Wang	Aron Art 120

CS1802

Section	Day & Time	CRN	Instructor	Room
350	Th 8:45-9:50	20162	M. Farahmand Asil	GSB125
351	Th 11:50-12:55	20163	S. Wang	Stern14
353	Th 10:35-11:40	20165	M. Farahmand Asil	NSB212
354	Th 10:35-11:40	20166	S. Wang	Stern14
355	Th 1:35-2:40	20167	S. Wang	Stern35
356	Th 1:35-2:40	20168	M. Farahmand Asil	CPM102
357	Th 3:00-4:05	20169	S. Wang	CPM102
358	Th 3:00-4:05	20170	M. Farahmand Asil	Vera Long 140

Teaching Assistants

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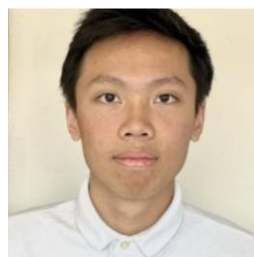
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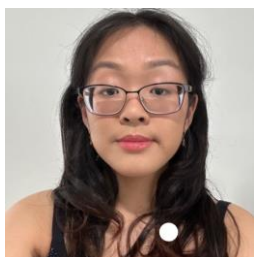
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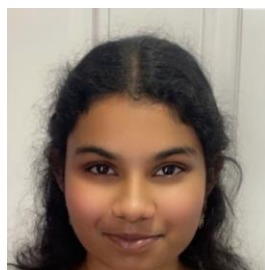
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TA office hours will be held online – check Canvas page for updated information. Please come to office hours having already made an attempt on the homework. TAs will be happy to help guide you on concepts and provide clarification on concepts. They cannot provide you with answers to problems or confirm your answers are correct.

Textbooks

Discrete Mathematics with Applications, by Susanna Epp, Cengage Learning, **4th edition** (2011) (also available in Olin Library on reserve). Note we will be using an older edition – 4th edition (not the 5th). You can find a free pdf version of the textbook online or purchase it online.

Discrete Structures, by Harriet Fell and Javed Aslam,

https://course.ccs.neu.edu/cs1800/_downloads/24089e2a2e1b84ea0c313f63b8963fc3/cs1800_text.pdf

Discrete Mathematics and Its Applications, by Kenneth Rosen. This is a supplemental textbook, a great resource for additional practice problems.

Tentative Schedule

Week	Topics	Assessment due
1 9/4-9/6	Welcome, number representations	
2 9/9- 9/13	Operations in different bases, 2's complement	
3 9/16-9/20	Logic	Quiz1, HW1
4 9/23-9/27	Set theory, logic circuits	Quiz2, HW2
5 9/30-10/4	Counting I	Quiz3, HW3
6 10/7-10/11	Counting II	Quiz4, HW4
7 10/14-10/18	Probability I, Exam I on Oct 18	Quiz5, ExamI
8 10/21-10/25	Probability II, distributions	
9 10/28-11/1	Graphs, BFS, DFS, Dijkstra's	Quiz6, HW5
10 11/4-11/8	Mathematical induction	Quiz7, HW6
11 11/11-11/15	Sequences and series, Exam II on Nov 15	Quiz8, HW7, ExamII
12 11/19-11/22	Function growth – big-O and Theta notations, search and sort algorithms	
13 11/25-11/26	Solving recurrences via substitution, Thanksgiving Nov 28	HW8
14 12/2-12/4	Review for Exam III, Exam III on Dec 4	Quiz9, HW9, ExamIII

Assessments and Grading

Assessment	Number	Weight
Assignments	9	40%
Exams	3	50% (I - 20%, II - 20%, III - 10%)
Quizzes	9	8%
Recitation Attendance	12	2%

Each student's lowest quiz grade will be dropped when computing their final grade. To earn recitation credit: attend 5-8 recitations to earn 1% credit and 9-12 recitations to earn 2% credit.

Grades will be calculated on an absolute basis: there will be no overall curving. A weighted average will be calculated according to the percentages attributed to each assessment method listed above. The mapping of the weighted average to letter grades is given below.

Grading Scale: A 93-100%, A- 90-92.99%, B+ 86-89.99%, B 83-85.99%, B- 80-82.99%, C+ 76-79.99%, C 73-75.99%, C- 70-72.99%, D+ 66-69.99%, D 63-65.99%, D- 60-62.99%, F 0-59.99%

To keep a transparent, consistent grading standard among all students:

- No extra credit will be offered to individual students.
- We will not adjust anyone's grade individually because they've asked (so please don't). If there are extraordinary circumstances that have impacted your learning, please reach out to Northeastern's WeCare <https://we-care.studentlife.northeastern.edu/> who can get in touch with us to make accommodations as necessary.

CS1800 and CS1802 are closely linked and the grades are combined. You will receive the **same grade** for CS1800 and CS1802.

Assignments and Quizzes

Homework and quizzes are assigned about once a week. It is important to start on the assignments early; starting an assignment the night before and running into problems will not get you much support or sympathy from the instructor or TAs. It is expected that the average student will spend at least six hours a week doing homework assignments.

An assignment that is late by no more than 24 hours (grace period) will earn **full** credit. An assignment that is later than 24 hours will **not** be accepted for credit. If you have accommodation arranged through DAS, make sure that you have emailed your letter to the instructor.

All homework assignments will be submitted on Gradescope. You can type up your answers, neatly write them by hand on iPad or write on paper and then scan with your phone. Please write solution to each problem on separate page(s). Do not write multiple problem solution on the same page. On Gradescope, it is important to correctly specify which page the answer to a problem is located. If a grader cannot find your answer to a problem on a specified page, you may earn 0 points. Submit a PDF or images to Gradescope. If you submit images, make sure they are JPEG, JPG, or PNG. (iPhones take HEIC pictures which do not show on a browser, so don't use those!) Gradescope accepts multiple submissions for a single assignment. We'll grade the latest one, ignoring previous versions.

Solutions to the assignments will be posted on Canvas two days after an assignment is due.

Our goal is to grade and return assignments back to you, on Gradescope, within one week. After getting your assignment back, you have the option to file a regrade request within one week. If you still have concerns or questions after regrading, email your instructor.

All quizzes are conducted on Gradescope. Any correct quiz question submission will have a little "correct!" rectangle placed under your answer. You may re-take the quiz as many times as you wish until it is due, usually on Mondays at 10 PM. Each student's lowest quiz grade will be dropped when computing their final grade.

Exams

There are three in-person exams on the following dates and times. Please mark them on your calendar.

- Exam I – Friday, **October 18, 2024, 7-8:45 PM**
- Exam II – Friday, **November 15, 2024, 7-8:45 PM**
- Exam III – Wednesday, **December 4, 2024, 7-8 PM**

Cooperation, AI Tools, and Academic Integrity

Generally, you are encouraged to discuss preliminary ideas for the assignments with others. Many students who participate in study groups do better in the course than if they work alone. You are not allowed to look at, copy, or in any way profit from somebody else's assignment, previous year's homework solutions, exams, or other answer sources. Specific examples of violations of Academic Integrity Policy include: looking at an assignment that was done by someone else; showing a student an assignment; copying answers from other sources.

Please be advised that while AI tools like ChatGPT can be invaluable for brainstorming and enhancing learning, they must be approached with critical discernment due to their potential imperfections, including producing imprecise outputs. Maintaining academic integrity is paramount: any content assisted or generated by AI must be properly attributed, and students should specify the role of the AI, the tool employed, and any input prompts at the beginning of assignments. Misrepresentation of AI-generated content as one's own or failure to accurately cite such contributions is a violation of our academic integrity policy and will be addressed accordingly. For optimal results with AI tools, it is recommended that students engage with them on familiar topics and provide clear, precise prompts, leveraging the synergy between human knowledge and AI capabilities.

The solutions to the assignments must be entirely your own work. If that is not the case, you must give proper credit to your sources. Write on the first page on the top of your assignment who (such as instructor, TA, AI tools) provided you assistance. Students will not be penalized for getting legitimate help on assignments as long as it is acknowledged. If you are unsure about whether the level of help you are receiving is acceptable, contact the instructor immediately. Behavior that deviates from these norms will be considered a violation of the Academic Integrity Policy, in which case the instructor will decide on an appropriate response including reporting the incident to the Office of Student Conduct & Conflict Resolution (OSCCR) for further sanction. The university's Academic Integrity Policy discusses actions regarded as violations and consequences for students, available at <https://osccr.sites.northeastern.edu/academic-integrity-policy/>

Inclusive Class

Northeastern University values the diversity of our students, staff, and faculty, and recognizes the important contributions each makes to our unique community. We strive to create a learning environment that is welcoming to students of all backgrounds. If you feel unwelcomed for any reason, please let us know so we can work to make things better.

Student Feedback

Your opinions are very important to us. All students are strongly encouraged to use the TRACE (Teacher Rating and Course Evaluation) system <https://www.northeastern.edu/trace/> near the end of the course to evaluate this course. In addition, we will be asking for your feedback periodically throughout the semester. However, if you have concerns about the course, please contact the instructor at any time!

Attendance and In-Class Conduct

Lectures and recitations are in-person and attendance is expected. If you are in class, it is expected that you will pay attention to the content being discussed. It is disrespectful of the class to have cell phones ring or to have students chatting, reading email, surfing the web, playing games, and sending instant or text messages during class. Hence, please turn off cell phones, and refrain from chatting and from using electronic devices unless you are taking notes.

To create and preserve a classroom atmosphere that optimizes teaching and learning, all participants share a responsibility in creating a civil and non-disruptive forum for the discussion of ideas. This includes all ways you interact with classmates – in lectures, office hours, study groups, etc.

Access Services and Accommodations

The **Disability Access Services** Office (DAS) provides advising, advocacy, and all necessary accommodations to help students with various abilities thrive at Northeastern. Please visit the Disability Access Services at <http://oakland.northeastern.edu/student-resources/access-services> or contact DASOakland@northeastern.edu. If you haven't already done so, please provide your letter from the DAS to your instructor early in the semester so that we can arrange those accommodations.

Where to Get Help

We are here to support your learning. If you have questions about the contents of the course or homework, please come to our office hours or post a question under **Discord** on Canvas. Some students also find study groups helpful. One of our textbook has a companion website www.cengage.com/math/epp that includes review guides and supplemental exercises with solutions.

Additional resources offered through Northeastern include:

Global Learner Support (GLS) <https://gls.northeastern.edu> provides learners with high-quality language, cultural, and academic support while promoting the development of intercultural competence and global understanding. GLS offers one-to-one tutorials for NU learners in the

areas of academic writing, academic presentations, APA/MLA citation, English language conversation, and professional communication.

WeCare <https://studentlife.northeastern.edu/we-care/> is a program operated through the Office for Student Affairs. The mission is to assist students experiencing unexpected challenges to maintaining their academic progress. WeCare works with students to coordinate among university offices and to offer appropriate on and off campus referrals to support successfully resolving the issue.

Counseling and Psychological Services (CAPS) <https://oakland.northeastern.edu/student-resources/health-and-wellness/counseling-and-psychological-services/> offers in-person individual and group counseling sessions on its Oakland campus to support student wellness and success. Students can call CAPS at 510-430-2111 or speak with the Cowell front desk to schedule an appointment. Urgent drop-in appointments are also available. Northeastern offers Find@Northeastern, which is a “24/7 mental health support” and can be reached at 1-877-233-9477.

Pantry – The Food & Basic Needs Pantry, a free service, is located at CPM 103.

Title IX

Title IX of the Education Amendments of 1972 protects individuals from sex or gender-based discrimination, including discrimination based on gender-identity, in educational programs and activities that receive federal financial assistance.

Northeastern University and its faculty are committed to creating a safe and open learning environment for all students. If you or someone you know has experienced a Prohibited Offense including sexual harassment, sexual assault, dating/domestic violence, or stalking, please know that help and support are available. Northeastern strongly encourages all members of the community to take action, seek support, and report incidents of Prohibited Offenses to the Title IX Coordinator within The Office for University Equity and Compliance (OUEC) through the Online Discrimination Complaint Form found at <https://www.northeastern.edu/ouec/file-a-complaint/>.

Please be aware that faculty members are Mandatory University Reporters who are required to disclose information about alleged discrimination, including sexual harassment, sexual assault, dating/domestic violence, or stalking to the OUEC. If the OUEC receives a report, a member of their office will reach out to offer information about your rights, support resources and pathways towards a resolution as a member of the campus community. Community members are not required to respond to this outreach. If you, or another community member you know wishes to speak to a confidential resource who does not have this reporting responsibility, please contact University Health and Counseling Services staff (<http://www.northeastern.edu/uhrs/>), the Center for Spiritual Dialogue and Service clergy members (<http://www.northeastern.edu/spirituallife/>) or the Sexual Violence Resource Center (open@northeastern.edu). By law, these confidential resources are not required to report allegations of discrimination to the University without your signed release.

Please visit <http://www.northeastern.edu/ouec> for a complete list of reporting options and support resources both on- and off-campus and contact the OUEC (ouec@northeastern.edu) at any time.

Land Acknowledgement

We recognize that the Oakland campus of Northeastern University sits in the territory of xučyun (Huichin), the ancestral and unceded land of the Chochenyo Muwekma Ohlone, the successors of the historic and sovereign Verona Band of Alameda County. We acknowledge the land and labor of the Ohlone people, whose connection to this land we remember, and whose presence—past, present, and future—we respect. As part of our mission of supporting and fostering learning through the generation and dissemination of knowledge, we acknowledge that the land we are meeting on today is the original homeland of Ohlone people.