Syllabus - Discrete Structures Fall 2020

Course Description:

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

Student Outcomes:

- Interpret and create binary and hex representations of numbers
- Create, simplify, and evaluate logical formulas and circuits
- Apply set operations
- Solve 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

Prerequisites:

There are no prerequisites for this course

Course Staff:

Online 1800 Instructor:

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NUFlex 1802 Instructors:

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Text: Discrete Structures by Harriet Fell and Javed A. Aslam. Purchase information is located here: https://titles.cognella.com/discrete-structures-9781634876469

Lecture videos, homework assignments, and recitation assignments will build on topics from the book, and it is a useful reference to supplement the lectures.

Course Attendance: Lecture videos will be released each week, and you are required to watch them before your recitation and starting your homework set. We recommend watching videos with paper and pencil handy to take notes. The homework assignments are directly related to the material discussed in video lectures and recitation.

Watching the course content and videos is required to succeed in this course.

Participation in recitation is required. We are assigned to a room that is large enough to accommodate everyone safely, masked and six feet apart. Please come to your recitation in-person if you are able to. Due to space limitations, you must attend the recitation you are registered for.

If you are remote, you can join your scheduled recitation via a Teams meeting (link will be posted on Canvas).

If you're remote and not able to join your recitation in real-time, we suggest you register for the asynchronous online section taught by Prof. Stalfa.

Grade Calculation:

40% Homework Assignments
25% Midterm
30% Final Project

5% Recitation

Homework: Homework will be assigned regularly in the course. In general, the homework will be given out on Friday and will be due the following Sunday at 8pm eastern. The detailed dates are listed on the schedule page on the course website and at the end of this document.

Homework Details: Each week there will be 6 questions required on the assignment. Questions will be labeled, easy, medium, or hard as to their perceived difficulty.

There will be additional honors questions for students in the Honors section. These problems may have different due date. Students in the regular section may attempt the problem, but it will not be graded. Honors students are required to complete the Honors' questions.

All homework will be typed. NO handwritten assignments will be graded. LaTeX files will be given for each assignment. LaTeX is is probably the easiest way to type your assignments. Students may use other applications, but must turn in a typed assignment. **For the first assignment students must use LaTeX.**

Students are welcome and encouraged to work together and discuss homework solutions among themselves. Every homework assignment should be written up separately and individually. Do not search online for solutions.

Homework will be submitted using Gradescope. Students can review their grades in Gradescope as well. **Students have one week after the homework grade has been published to request a regrade.** All regrade requests after one week will not be granted.

Recitation: During your scheduled recitation, you'll work on a short list of problems related to recent lecture/video material. If you're working asynchronously, dedicate 65 minutes to work on the problems. Submit what you've worked on at the end of the time. You earn full credit for a recitation by using your time well and demonstrating effort on the assignment.

Midterm Exam: There will be one timed exam during the course on November 12. This exam will be done online through Gradescope.

Final Project: There will be one final project in the course due December 14. Students will make a short video explaining a few problems chosen by the instructors. Details will be given out after the midterm.

Feedback: Your thoughts and concerns about this course are important. You are encouraged to give feedback to the instructors and teaching assistants throughout the term. Students will be asked to fill out a course evaluation at the middle and end of the term.

NUFlex: During recitation, instructors will wear a face covering, and we expect you to do the same. We all need to stay six feet apart, including when we are masked. We won't be able to eat or drink in class (except water). If you test positive for COVID-19, you will need to enter isolation as directed by the university's telehealth team. We expect that you will not come in-person to class and that you will follow the guidance from the university telehealth team to isolate and get appropriate healthcare if needed.

In-person meetings will not be recorded.

Academic Misconduct: Writing proofs, algorithms, and mathematical arguments is a creative process. Individuals must reach their own understanding of problems and discover paths to their solutions. During this time, discussions with friends and colleagues are encouraged—you will do much better in the course, and at Northeastern, if you find people with whom you regularly discuss problems. But those discussions should take place verbally. If you share written work, you're breaking the rules. When you begin writing up your solutions, discussions are no longer appropriate. Each problem solution must be entirely your own work.

Do not, under any circumstances, permit any other student to see any part of your written solution, and do not permit yourself to see any part of another student's written solution. This is a direct violation of the course collaboration policy.

If any student does not understand these terms or any material outlined in Northeastern University Academic Integrity Policy (http://www.northeastern.edu/osccr/academichonesty.html) it is their responsibility to talk to the professor. All cases of suspected plagiarism or other academic dishonesty will be referred to the Office of Student Conduct and Conflict Resolution (OSCCR).

Inclusive Class: Northeastern University values the diversity of our students, staff, and faculty; recognizing the important contribution each makes to our unique community.

Respect is demanded at all times throughout this course. In the classroom, not only is participation required, it is expected that everyone is treated with dignity and respect. We realize everyone comes from a different background with different experiences and abilities. Our knowledge will always be used to better everyone in the class.

We strive to create a learning environment that is welcoming to students of all backgrounds. If you feel unwelcome for any reason, please let us know so we can work to make things better. You can let us know by talking to anyone on the teaching staff. If you feel uncomfortable talking to members of the teaching staff, please consider reaching out to your academic advisor.

Northeastern is committed to providing equal access and support to all qualified students through the provision of reasonable accommodations so that each student may fully participate in the learning experience. If you have a disability that requires accommodations, please contact the Disability Resource Center http://www.northeastern.edu/drc/, DRC@northeastern.edu, 617-353-2675. Accommodations cannot be made retroactively and to receive an accommodation a letter from the DRC or LDP is required.

Schedule:

September 14 - Module 1 Binary Completed
September 18 - Homework 1 Out
September 21 - Module 2 Statements, Logic Completed
September 25 - Homework 2 Out
September 27 - Homework 1 Due

September 28 - Module 3 Sets Completed
October 2 - Homework 3 Out
October 4 - Homework 2 Due
October 5 - Module 4 Set Cardinality Completed
October 9 - Homework 4 Out
October 11 - Homework 3 Due
October 12 - Module 5 Combinatorics Completed
October 16 - Homework 5 Out
October 18 - Homework 4 Due
October 19 - Module 6 Completed
October 23 - Homework 6 Out
October 25 - Homework 5 Due
October 26 - Module 7 Lessons 1 and 2 Completed
October 30 - Homework 7 Out
November 1 - Homework 6 Due
November 2 - Module 7 Lessons 3, 4, and 5 Completed
November 8 - Homework 7 Due
November 9 - Module 8 Sorting and Asymptotic Completed
November 12 - Midterm
November 13 - Homework 8 Out
November 16 - Module 9 Relations and Functions Completed
November 22 - Homework 8 Due
November 23 - Module 10 - Lessons 1, 2, and 3 Completed
November 30 - Final Project Out
December 7 - Module 10 - Lessons 4, 5, and 6 Completed
December 14 - Project Due