1 Overview

In this course we continue our study of the mathematical foundations of computer science begun in CS 14 with the aim of deepening our understanding of algorithm complexity. We will focus on problems from a branch of mathematics known as “graph theory”, which is concerned with networks as they arise in all sorts of settings, from transportation to the internet. In order to be able to analyze the complexity of graph theory algorithms, we will also study functions in some depth, especially recursively defined functions.
2 Learning Objectives

Liberal Arts Objectives: The most important objectives for this course are those which are common to all computer science courses:

1. to learn to solve unfamiliar problems (without being taught how to solve them!);
2. to think clearly and analytically;
3. to work cooperatively;
4. to read closely;
5. to write and speak precisely;
6. to reflect on the role of the university and liberal arts education in society.

Computer Science Objectives: Here are some specific questions you will be able to answer by the end of the semester.

1. What is a relation? Give some examples of important relations that arise in computer science.
2. What does it mean for a relation to be a function? Which of your examples above are functions?
3. What are some methods for comparing the complexity of two functions? Why do we as computer scientists need to be able to perform such comparisons?
4. How can a function or relation be defined recursively? Why are recursively defined functions and relations important in computer science?
5. What is a graph? Give examples of how graphs arise in diverse applications, such as traffic engineering, artificial intelligence, and computer network theory.
6. How can graphs be represented and studied using a computer?
3 Graded Work

Quizzes: Regular quizzes will be used to test your understanding of all the concepts discussed in class. Quizzes will be announced ahead of time, and will usually take place at the very start of class. The lowest two quiz grades will be dropped when calculating the average quiz grade. If you miss a quiz, either due to lateness or to absence, you will not have an opportunity to make it up; rather, this will be among the grades that is dropped.

Midterm and Final Exams: There will be two midterm exams. The average exam grade will be calculated as follows: each midterm grade will be written down once, and the final exam grade will be written down twice. The lowest grade will be dropped, and the remaining three grades will be averaged. If you miss a midterm, you will not have an opportunity to make it up; rather, this will be the grade that is dropped.

Definitions and Homework: In order to succeed in this class you need to be able to understand and use precise mathematical definitions of the terms introduced. Each of you is required to keep a stack of index cards with the relevant definitions from the class and from the text. Each definition should be a complete sentence that incorporates the word being defined, and that avoids constructions like “is when”. You are encouraged to copy these definitions verbatim from the text or from class notes. You must not include any examples or theorems on your index cards. You are allowed to bring these index cards to every quiz and exam. You are not allowed to share index cards, and each student should prepare his or her own stack of index cards.

Homework will not be collected or graded, but most of the learning that happens in this class happens when you’re doing homework. You should spend at least 6 hours per week working on homework if you want to really conquer the material and perform well in the class. I encourage you to form study groups to help you allocate adequate time for homework and to make doing the homework fun. Homework questions will routinely appear on quizzes, either verbatim or modified slightly. Students are encouraged to ask questions about the homework in class and in office hours.

Grade Breakdown:

- quizzes 35%
- midterms and final 65%
4 Policies

Attendance and Makeup Policies  Students are required to attend class, and are expected to attend office hours as well.

Every student will be assigned a “buddy”. The understanding is that you and your buddy are responsible for looking after each other should one of you be absent by giving each other all the materials you need, such as lecture notes, handouts and announcements. You must get this before the next class meeting. (Do not ask me for these materials in email, as I may well not be able to get back to you before the next class meeting.)

If an emergency arises and you must miss the final exam, contact me immediately. If you have a valid reason for missing the final (which you can document appropriately), then you will be given an incomplete, and you will take the final at the start of the next semester.

Email Policy  I prefer to answer as many questions as possible in office hours – this way we can ask each other questions and I can address your needs more effectively. Written work is handed in in hard copy in office hours or in class – not in email. If you miss a class, contact one of your fellow students to get all the notes and handouts; if you still have questions or if you need to schedule an appointment outside of office hours, please do email me.

Academic Honesty:  Students enrolled in this class implicitly promise to adhere to Hofstra’s policies regarding academic honesty. Whenever you consult anyone (another student in this class, another student not in this class, a tutor, an instructor, anyone) for help with the written work, you must acknowledge the help you received in writing. Students who are found to have violated their promise (either by cheating or by assisting another student in cheating) are given a 0 on the given assignment, are reported to the dean, and may, furthermore, receive an automatic F in the class.

Important Dates:

• Monday, February 22: Last day to drop without receiving a “W” on transcript

• Monday, April 11: Last day to withdraw from course