Syllabus for CS311: Mathematics for Computer Science

Adam Klivans

Fall 2017

1 Course Overview

This course will give you the mathematical tools you need to succeed in Computer Science. We will used a "flipped" classroom where you will watch some short videos online *before* class and during class we will primarily do problem solving. You will need to sign up for the Quest online system `quest.cns.utexas.edu`.

2 Instructors

- Instructor: Prof. Adam Klivans (office hours: 4-5pm Tues in GDC 4.826).
- TA: Manu Viswanadhan (`manuviswanadhan@utexas.edu`) Office Hours: 1–2:30pm Wednesday GDC TA Stations.
- TA: Sushrut Karmalkar (`s.sushrut@gmail.com`) Office Hours: Friday 3–4:30pm Friday GDC TA Stations.
- Proctor William Han (`copperstick6@gmail.com`) Office Hours: Friday 1-3pm GDC TA Stations.
- Proctor Will Sherwood. Office Hours: Thursday 2-3pm GDC TA Stations.

3 Course Calendar

`www.cs.utexas.edu/~klivans/311f17.html`

4 Classroom

GDC 2.216 at 12:30pm.

5 Quest

Sign up for Quest! `quest.cns.utexas.edu` That's where all the videos are stored.

6 Piazza site for class

`TBD`

7 The Quickest Way to Get a Question Answered

Use the class Piazza site `https://piazza.com/utexas/fall2017/311/home`.

8 The Next Quickest Way to Get a Question Answered

Email one of your TAs.

9 The Slowest Way to Get a Question Answered

Email the Professor.

10 Syllabus

Rosen refers to the text "Discrete Mathematics and its Applications," by Kenneth Rosen, 7th edition. The text is *optional*. Below is a list of topics we will cover (and corresponding sections from Rosen if you wish to use the book).

- Predicates, Quantifiers, and Satisfiability (1 week) [Rosen 1.3–1.5] –Encode statements into predicates with quantifiers. –Boolean formulas; the notion of Satisfiability.
- Basic Proof Techniques (1 week) [Rosen 1.6–1.7] –Direct Proof; Proof by Contradiction; – Simple Examples; Refresher on summation notation.
- Induction and Invariants (1.5-2 weeks) [Rosen 4.1–4.3] –Basic proofs by induction –Proving simple invariants
- Graph Theory (3 weeks) [Rosen 9.1,9.2,9.7,9.8,10.1] – Graph Coloring and applications – Trees – Planarity – Proving simple graph properties using induction
- Sets and Functions (2-2.5 weeks) [Rosen 2.1–2.4] – Definitions, Relations – Injections, Surjections, and Bijections – Infinite sets; uncountability
- Recurrences (2 weeks) [Rosen 7.1–7.3] –Recurrences; applications to counting –Solving Linear recurrences
- Big-O and Intro to Algorithms (2 weeks) [Rosen 3.1–3.3] –Growth of common functions; Big-O and Big-Omega –Master Theorem and Intro to algorithms (simple divide and conquer)

The syllabus is subject to change depending on students' background and interests.

11 Assignment, Assessment, Evaluation

- There will be at least six homeworks (30%), two midterms (15% each), and one final (30%). Pop Quizzes will account for 10% of the grade.
- The course is curved, but it is possible for everyone in the class to get an A. Low scores are not necessarily bad; your score relative to others in the class is much more important.
- Homework should be turned in electronically on Canvas (this is subject to change). Students are encouraged to use Latex to typeset their solutions and email them to the instructor. You may have two free "late days" that you can use all on one homework or on two homeworks. You must indicate on Canvas when you are using a late day(s). Otherwise, homework that is one day late is worth 50%. Homework is worth 0% if turned in more than one day late.
- You may discuss each homework with at most two other students, but YOU MUST WRITE UP YOUR SOLUTIONS BY YOURSELF.
- You may not under any circumstances search for a solution to homework on the internet, in a book or from any other resource. Each student in this course is expected to abide by the University of Texas Honor Code.

12 Other University Notices and Policies

12.1 Documented Disability Statement

Any student with a documented disability who requires academic accommodations should contact Services for Students with Disabilities (SSD) at (512) 471-6259 (voice) or 1-866-329-3986 (video phone). Faculty are not required to provide accommodations without an official accommodation letter from SSD. Please notify me as quickly as possible if the material being presented in class is not accessible (e.g., instructional videos need captioning, course packets are not readable for proper alternative text conversion, etc.). Contact Services for Students with Disabilities at 471-6259 (voice) or 1-866-329-3986 (video phone) or reference SSDs website for more disability-related information: `http://www.utexas.edu/diversity/ddce/ssd/for_cstudents.php`

12.2 Behavior Concerns Advice Line

If you are worried about someone who is acting differently, you may use the Behavior Concerns Advice Line to discuss by phone your concerns about another individuals behavior. This service is provided through a partnership among the Office of the Dean of Students, the Counseling and Mental Health Center (CMHC), the Employee Assistance Program (EAP), and The University of Texas Police Department (UTPD). Call 512-232-5050 or visit `http://www.utexas.edu/safety/bcal`.