

General Information

September 10, 2020

Informal Course Description

Discrete mathematics provides the language and abstractions required to reason about many concepts in computer science. Most topics studied in a high school mathematics curriculum (such algebra, trigonometry, and calculus) are concerned with continuous phenomena. These subjects form the foundation for the physical sciences and engineering. Discrete mathematics, on the other hand, underlies the science and technology of the computer age. Discrete mathematics is concerned with mathematical structures that are composed of distinct pieces or processes that are composed of individual steps. Since the native language of computers is expressed in binary (0's and 1's), it is natural that the formalism we use to describe them is discrete mathematics. Computer Science requires a somewhat different type of math than what you have learnt so far.

Classical continuous math, like calculus or differential equations is based on recipes – once you learn the recipes, the entire exercise is to apply them correctly. In contrast, computer science can be viewed as problem solving with discrete objects – bits, integers, sets, and graphs. This requires a different style of creative thinking, where the goal often is to come up with a recipe instead of applying a known recipe. The entire goal of the course is to train you to think in this fashion.

Topics Covered

- Mathematical Logic
- Proof Theory
- Mathematical Induction
- Combinatorics
- Number Theory
- Probability

Learning outcomes

- Familiarizing the basic terminologies and methods of discrete mathematics.
- State practical problems as discrete mathematics problems and solve them.
- Construct proofs using proof techniques such as mathematical induction, contradiction, counterexample and construction.
- Manipulate expressions in propositional logic and first order predicate logic.
- Perform simple combinatorial calculations.
- Formulate and prove theorems in simple number theory.

Web-based Text (zyBook)

The text for this class is a web-based, interactive, animated "textbook", called a zyBook. You are required to have an account for the course. The material includes interactive exercises which will count towards your grade. The directions for subscribing can be found at:

1. Sign up at [zyBooks.com](https://zybooks.com)
2. Enter zyBook code SFUMACM101BhattacharyaFall2020
3. Click *Subscribe*

A subscription is \$48 (US). Students may begin subscribing on Aug 24, 2020 and the cutoff to subscribe is Dec 09, 2020. Subscriptions will last until Jan 05, 2021.

Communication

Canvas

Students in this class are encouraged to participate and ask questions in online discussions and office hours, as well as on Canvas. Because the students in the class will have a diversity of backgrounds and experiences, every member of this class must show respect for every other member of this class

Zoom

Lectures, tutorials and office hours will be held through Zoom. The Canvas page will have links to the Zoom meeting rooms for course staffs. Transcripts of Zoom lectures will be made available for a limited period of time.

Course webpage

The url for the course webpage is www.cs.sfu.ca/~binay/2020/macm101 containing the following information.

- Office hours, contact information
- Schedule
 - Topics being covered
 - Reading assignments
 - Homeworks
 - Test schedule
- All hand-outs/announcements

Coursys

You will hand in written homework through Coursys system. The url for Coursys is <https://coursys.sfu.ca/2020fa-macm-101-d2/>

You will hand-in your homework here for grading. Coursys will maintain all your scores.

Grading

The grading distribution for the course MACM 101 is

- Participation Activities (PA). (5%)
- Challenging Activities (CA) (10%)
- Written Homeworks (HW) (10%)
- Tests (25%)
- Final (50%)

Participation activity is like reading assignment. There are some problems you are supposed to work out before coming to the class. zyBooks will keep a record of your activities. Any activity after the class will not be taken into consideration. Challenging activity exercises are like practice problems. For some problems, textbook solutions can be accessed.

I am frequently asked whether I curve the grades. First of all, no letter grades are assigned to scores until I calculate a final course percentage for each student. Sometimes I am a bit more generous depending on the distribution of scores. Occasionally I give a test or final that is harder than I expect. In those circumstances, I will sometimes make a problem count as extra credit.

Exercises

There will be many chances to practice solving problems.

1. **Participation activities within the zyBook textbook:** Carefully go through the practicing problems before answering. You are allowed to try multiple times for the correct answer. Make a note of any answers which you miss, so you can learn from your mistakes.
2. **zyBook challenge questions:** These will be automatically graded, similar to the other questions within the zyBook.
3. **Additional zyBook exercises:** These problems are available at the end of each section. The solutions to many of these problems will be made available to you. You will learn the most if you solve these problems carefully before looking at the solution.
4. **Class/homework exercise:** These will be from additional exercises or from other sources. The problems from other sources will be made available in a pdf file. You are required to submit the solutions to non-zyBook questions through Coursys server. Solutions will be posted to these exercises.

Reading Assignments

Multiple sections of the zyBook are associated with each lecture period. Complete these (including the participation activities) before the class period. I will cover the sections as listed in the zyBook textbook.