

**Dalhousie University**  
**Discrete Structures I      MATH/CSCI 2112      Winter 2019**

- **Instructor:** Nauzer Kalyaniwalla, CS 221; 494-2841 nauzer@dal.ca
- **Times:** MWF 11:35 - 12:25 LSC C242.
- **Office Hours:** Tue 11:30 - 12:30; Wed 9:30 - 11:00; Thu 11:30 - 12:30/**Open door**
- **Web:** <https://dal.brightspace.com>
- **Texts:** (i) *Book of Proof* by Richard Hammack, available online at:  
<http://www.people.vcu.edu/~rhammack/BookOfProof/>  
(ii) *Lectures in Discrete Mathematics*, by Edward A. Bender and S. Gill Williamson  
(A source of practice problems), available on-line at:  
<http://cseweb.ucsd.edu/~gill/BWLectSite/>  
(iii) *Discrete Mathematics, an Open Introduction*, by Oscar Levin  
<http://discrete.openmathbooks.org/dmoi3.html>

A schedule of topics and class notes will be posted on the course page on Brightspace. Students are responsible for material covered in class.

For additional reading:

- *Discrete Mathematics with Applications*, Susanna S. Epp. In Killam library.
- *Discrete & Combinatorial Mathematics*, Ralph P. Grimald. In Killam library.
- **Evaluation:**

Assignments	20 %	<i>~8 in total</i>
Quizzes	$3 \times 5 = 15$	23/01; 06/02; 20/03
Mid-Term	23 %	26 Feb 6:00-7:30pm, Dunn 117
Final	42%	Schedule by Registrar.

*Conversion of marks to letter grades follows Dalhousie Common Grade Scale*

- **Course Objectives/Learning Outcomes**
  - Use truth tables and logical reasoning to evaluate elementary logical arguments.
  - To build basic skills in mathematical reasoning.
  - To become familiar with the basic terminology and concepts in logic and set theory, combinatorics, and number theory.
  - To be able to develop formal mathematical proof through direct proof, proof by cases, proof by contradiction, proof by contrapositive, and proof by induction.
  - Be able to perform computations in modular arithmetic, and to understand the relevant number system.
  - Be able to calculate the number of possible outcomes for problems involving combinations and permutations.
  - Be able to prove the correctness of simple recursive algorithms.

• **Course Policies:**

**Assignments:** Weekly assignments will be posted on BrightSpace, and have to be submitted electronically. Please follow the instructions below precisely; up to 50% of points will be deducted for violations of the format. Points will be deducted for late submissions. Assignments, that are more than 48 hrs. late, will not be accepted

- Submit your solutions to the assignment questions **in order**.
- Start each question on a **new page**.
- Submit your solutions as a *pdf* file.

**Exams and Quizzes:** All quizzes and exams are closed book. No calculators. No listening devices. Bring a pen to print your name on your paper.

**Policy on missed exams or quizzes:** When you miss an exam or quiz, you must let me know via email *before the start of the exam/quiz*. If you fail to do so, then you will automatically receive a failing grade on the exam/quiz, and there will be no accommodations made. If you did notify me and have a valid excuse, the following applies. If you miss a quiz, your quiz mark will be computed out of the remaining quizzes. If you miss the midterm or final exam, there will be a scheduled make-up exam.

**Other relevant policies** A document containing Dalhousie's policies on plagiarism, accessibility, and a number of other important issues has been posted to Brightspace.

• **Intellectual Honesty:** It is expected that students will discuss assignment problems and help each other **but** students are expected to hand in **only** their own effort. All assigned problems are expected to be "done from scratch" (It **will** pay to attempt them on your own). Avoid searching for solutions on the Internet *etc*. Document any help received and any resources used.

**To this end please look at the information and resources available at:**

<http://academicintegrity.dal.ca> and

the full text of Dalhousie's Policy on Intellectual Honesty and Faculty Discipline Procedures at:

[www.dal.ca/dept/university\\_secretariat/academic-integrity/academic-policies.html](http://www.dal.ca/dept/university_secretariat/academic-integrity/academic-policies.html) .

In addition, Dalhousie University's student code of conduct can be found at:

[http://www.dal.ca/dept/university\\_secretariat/policies/student-life/code-of-student-conduct.html](http://www.dal.ca/dept/university_secretariat/policies/student-life/code-of-student-conduct.html)

*Please refer to the course web-page for further resources available to you.*

Week of	Topics	In Text
7 Jan	Introduction; Logic and Boolean functions	BoP 1.2; 2.1-2.5 (units BF, Lo-1)
14 Jan	Predicate Logic, Inference	BoP 2.7 - 2.12 + notes (unit Lo-2)
21 Jan	Counting	BoP 1.3, 1.4; <b>Ch 3</b> ; 12.3
23 Jan	Quiz 1	in class
28 Jan	Proofs and Number Theory	BoP Ch. 4, 5, 6, 7, 12.3 ( <b>unit NT</b> )
1 Feb	MUNRO DAY	no class.
4 Feb	Counting (continued)	BoP Ch. 3; 1.3, 1.4;
6 Feb	Quiz 2	in class
11 Feb	Proofs and Number Theory continued	
18 Feb	Reading Week	no classes
25 Feb	Introduction to Induction	BoP 1.9; Ch.10, (unit IS) + notes
26 Feb	MID-TERM	6:00 - 7:30pm Dunn 117 (?)
4 Mar	Induction continued ...	
11 Mar	Recursively defined functions and algorithms.	BoP 10 + notes
18 Mar	Recursively defined functions and algorithms.	
20 Mar	Quiz 3	In class
25 Mar	Equivalence Relations and Linear Congruences; FLT	BoP 1.2; 11; + notes
1 Apr	Cardinality of Sets;	BoP 1.10; 13 + notes
8 April	Review/Practice	

TABLE 1. **BoP**: Book Of Proof; **units BF, Lo, NT, IS**: Lectures in Discrete Math