



A POLYTECHNIC INSTITUTION

School of Computing & Academic Studies  
Program: Part-time Studies

## Discrete Mathematics

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<b>Start Date:</b>	June 2, 2008	<b>End Date:</b>	July 24, 2008
<b>Total Hours:</b>	48	<b>Total Weeks:</b>	8
<b>Hours/Week:</b>	6	<b>Lecture:</b>	4
		<b>Lab:</b>	2
<b>Prerequisites</b>		<b>Term/Level:</b>	2
<b>Course No.</b>	<b>Course Name</b>	<b>Course Credits:</b>	4
Comp 1113	Applied Mathematics		
		<b>200820</b>	
		<b>COMP 2121 is a Prerequisite for:</b>	
		<b>Course No.</b>	<b>Course Name</b>
		<b>Option</b>	COMP 3760
		<b>Placement</b>	

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### ■ Course Description

Discrete Mathematics concerns processes that consist of a sequence of individual steps. The ideas of discrete mathematics underline the science and technology specific to computer applications.

The Discrete Mathematics course provides the mathematical basis and concepts for applications in computer science: elementary logic, the logic of quantified statements, methods of proof, set theory, discrete functions, relations, counting and probabilities, sequences and mathematical induction, recursion, graphs, trees, and Boolean algebra.

### ■ Detailed Course Description (optional):

### ■ Evaluation

Assignments	10	Comments:
Lab Quizzes	20	Comments:
Midterm	30	Comments:
Final Exam	40	Comments:
<b>TOTAL</b>	<b>100%</b>	

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**Assignments:** There will be 4 assignments in this course. You are required to submit the assignments in groups of two. Unless you are the odd person in a set with an odd number of students, you will be required to work with a person in your set.

**Quizzes:** Each week during the lab you will be given a short quiz. The quiz will be based on the lecture material covered in the previous two weeks. If you have questions regarding the previous material, you can ask questions before the quiz. To receive the mark for the quiz, you must be present when it is given. All quizzes count so there is a benefit to attending the lab.

**Exams:** There are two exams in this course: one midterms and a final exam. The final exam will be based on the entire course material.

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## ■ Course Learning Outcomes/Competencies

Upon successful completion, the student will be able to:

- Prove that an argument is valid using a truth table or valid argument forms
- Prove mathematical arguments using Direct Proof and Counterexample
- Solve problems in set theory and relate its concepts to enumeration problems and probability
- Solve problems in basic counting theory involving combinations and permutations
- Work with discrete mathematics functions and use them in applications
- Design finite-state automata and finite-state machines
- Apply the basic concepts and formulas of probability and distinguish between independent and mutually exclusive events
- Compute event probabilities using probabilities trees
- Apply mathematical induction to the solution of problems
- Understand properties of integers
- Represent computing problems in the form of a graph and tree
- Diagram and identify properties of graphs and trees
- Illustrate basic graph algorithms such as minimal spanning trees and shortest path
- Use tree structure on problems related to searching and sorting
- Carry out operations using sigma notation

## ■ Verification

I verify that the content of this course outline is current.  
Jason Harrison

March 15, 2008

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Authoring Instructor

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Date

I verify that this course outline has been reviewed.

Kevin Cudihee

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Program Head/Chief Instructor

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Date

I verify that this course outline complies with BCIT policy.

Kim Dotto

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Dean/Associate Dean

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Date

Note: Should changes be required to the content of this course outline, students will be given reasonable notice.

## ■ Instructor(s)

E-mail Address:  
[Jason\\_Harrison@bcit.ca](mailto:Jason_Harrison@bcit.ca)

Phone number:  
604.453.4008

## ■ Learning Resources

### Required:

*Required:* Discrete and Combinatorial Mathematics, an Applied Introduction, by Ralph P. Grimaldi, Fifth Edition, ISBN 0-201-72634-3.

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Recommended:

■ Assignment Details

## ■ Information for Students

By attending this course and receiving this course outline, you have been made aware of the following policies. Please follow the links provided as each student is responsible for reading and complying with these policies.

The following statements are in accordance with the *BCIT Student Regulations Policy 5002*. To review the full policy, please refer to <http://www.bcit.ca/files/pdf/policies/5002.pdf>.

### **Attendance/Illness:**

In case of illness or other unavoidable cause of absence, the student must communicate as soon as possible with his/her instructor or Program Head or Chief Instructor, indicating the reason for the absence. Prolonged illness of three or more consecutive days must have a BCIT medical certificate sent to the department. Excessive absence may result in failure or immediate withdrawal from the course or program.

### **Academic Misconduct:**

Violations of academic integrity, including dishonesty in assignments, examinations, or other academic performances are prohibited and will be handled in accordance with the *Violations of Standards of Conduct* section of Policy 5002.

The School of Computing and Academic Studies expects the highest level of professional conduct and ethical behaviour from all students enrolled in part time studies courses and programs. All students are reminded of the BCIT policy related to the *Responsible Use of Information Technology*. Read the full policy here: <http://www.bcit.ca/files/pdf/policies/3501.pdf>.

The Computing and IT knowledge and skills acquired by students in the course of their studies confers upon them, as with all professionals, a special responsibility to use their knowledge in a responsible, professional and ethical manner. Further, given that misuse of computer facilities at BCIT can have significant legal and/or economic impacts, upon evidence of any such misconduct, the School may recommend immediate suspension, even for first offences.

### **Attempts:**

Students must successfully complete a course within a maximum of three attempts at the course. Students with two attempts in a single course will be allowed to repeat the course only upon special written permission from the Associate Dean. Students who have not successfully completed a course within three attempts will not be eligible to graduate from their respective program.

### **Accommodation:**

Any student who may require accommodation from BCIT because of a physical or mental disability should refer to BCIT's Policy on Accommodation for Students with Disabilities (<http://www.bcit.ca/files/pdf/policies/4501.pdf>), and contact BCIT's Disability Resource Centre (SW1-2300, 604-451-6963, <http://www.bcit.ca/drc/>) at the earliest possible time. Requests for accommodation must be made to the Disability Resource Centre, and should not be made to a course instructor or Program area.

Any student who needs special assistance in the event of a medical emergency or building evacuation (either because of a disability or for any other reason) should also promptly inform their course instructor(s) and the Disability Resource Centre of their personal circumstances.

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## Schedule

Lessons	Topics	Reference/Reading
	Fundamental Principles of Counting: Permutations, Binomial Theorem, Combinations (with and without repetition).	Chapter 1
	Fundamentals of Logic: Rules of Inference, use of Quantifiers, Proofs of Theorems	Chapter 2
	Set Theory: Sets and subsets, Laws of Set Theory, Probability	Chapter 3
	Properties of Integers: Mathematical Induction, the Division Algorithm, the Euclidian Algorithm	Chapter 5
	Finite State Machines	Chapter 6
	Graphs & Trees: Definitions, Properties, Rooted Trees, Tree traversals, Searching and connectivity , Prefix Codes, Minimal Spanning Trees	Chapters 11& 12

\* This schedule is subject to change at the discretion of the instructor.

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