



**School of Arts & Science
MATHEMATICS DEPARTMENT**

**MATH 222-01
Discrete Mathematics
2006Q1**

COURSE OUTLINE

The Approved Course Description is available on the web @ _____

Ω Please note: this outline will be electronically stored for five (5) years only.
It is strongly recommended students keep this outline for your records.

1. Instructor Information

(a)	Instructor:	Gilles Cazelaïs		
(b)	Office Hours:	http://pacificcoast.net/cazelais/schedule.html		
(c)	Location:	CBA 158		
(d)	Phone:	370-4495	Alternative Phone:	
(e)	Email:	cazelais@camosun.bc.ca		
(f)	Website:	http://pacificcoast.net/cazelais/222.html		

2. Intended Learning Outcomes

(No changes are to be made to this section, unless the Approved Course Description has been forwarded through EDCO for approval.)

Upon completion of this course the student will be able to:

1. Use truth tables to establish the equivalence/non-equivalence of compound propositions involving negation, conjunction, disjunction, exclusion or implication, converse, contrapositive, inverse, and biconditional.
2. Solve logic puzzles (including determination of consistency of system specifications).
3. Create propositions from predicates with the use of quantifiers.
4. Prove or disprove theorems by using various methods (direct proofs, proofs by contradiction, mathematical induction; counterexamples).
5. Prove set equivalences using membership, basic set identities and logical equivalences.
6. Describe the growth of functions using big-O, big Omega and big-Theta notation.
7. Show how functions and sequences can be defined recursively.
8. Use the fundamental concepts of number theory to solve problems concerning divisibility, prime factorization and congruences.
9. Use permutations and combinations to solve counting problems (including those in which repetition is allowed).
10. Use recurrence relations to solve counting problems.
11. Construct Euler circuit/path and Hamilton circuit/path.
12. Solve a shortest-path problem.
13. Apply various tree applications (binary tree, Huffman prefix codes, decision tree, game tree).
14. Minimize circuits by using Karnaugh maps and Boolean algebra.

3. Required Materials

(a)	Texts	Discrete Mathematics and Its Applications (5th Edition) by Kenneth H. Rosen.
(b)	Other	

4. Course Content and Schedule

(Can include: class hours, lab hours, out of class requirements and/or dates for quizzes, exams, lectures, labs, seminars, practicums, etc.)

Course Outline

1. The Foundations: Logic and Proof, Sets, and Functions

- Logic (1.1)
- Propositional Equivalences (1.2)
- Predicate and Quantifiers (1.3)
- Nested Quantifiers (1.4)
- Methods of Proofs (1.5)
- Sets (1.6)
- Set Operations (1.7)
- Functions (1.8)

2. The Fundamentals: Algorithms, The Integers, and Matrices

- Algorithms (2.1)
- The Growth of Functions (2.2)
- Complexity of Algorithms (2.3)
- The Integers and Division (2.4)
- Integers and Algorithms (2.5)
- Applications of Number Theory (2.6)

3. Mathematical Reasoning: Induction and Recursion

- Proof Strategy (3.1)
- Mathematical Induction (3.3)
- Recursive Definitions and Structural Induction (3.3)
- Recursive Algorithms (3.4)

4. Counting

- The Basics of Counting (4.1)
- The Pigeonhole Principle (4.2)
- Permutations and Combinations (4.3)
- Binomial Coefficients (4.4)
- Generalized Permutations and Combinations (4.6)

5. Advanced Counting Techniques

- Recurrence Relations (6.1)
- Solving Recurrence Relations (6.2)
- Inclusion–Exclusion (6.5)

6. Graphs

- Introduction to Graphs (8.1)
- Graph Terminology (8.2)
- Representing Graphs and Graphs Isomorphism (8.3)
- Connectivity (Definitions only) (8.4)
- Euler and Hamilton Paths (8.5)
- Shortest Path Problems (8.6)

7. Trees

- Introductions to Trees (9.1)
- Applications of Trees (9.2)

- 8. Boolean Algebra
 - Boolean Functions (10.1)
 - Representing Boolean Functions (10.2)
 - Logic Gates (10.3)
 - Minimization of Circuits (10.4)

5. Basis of Student Assessment (Weighting)

(Should be linked directly to learning outcomes.)

(a)	Assignments	Homework Assignments : 10%
(b)	Quizzes	
(c)	Exams	<ul style="list-style-type: none"> · Two term tests: 40% · Comprehensive final exam: 50% Final exams are held from December 11 - 15. You must be available at the scheduled time.
(d)	Other (eg, Attendance, Project, Group Work)	

6. Grading System

(No changes are to be made to this section, unless the Approved Course Description has been forwarded through EDCO for approval.)

Standard Grading System (GPA)

Percentage	Grade	Description	Grade Point Equivalency
95-100	A+		9
90-94	A		8
85-89	A-		7
80-84	B+		6
75-79	B		5
70-74	B-		4
65-69	C+		3
60-64	C		2
50-59	D		1
0-49	F	Minimum level has not been achieved.	0

Temporary Grades

Temporary grades are assigned for specific circumstances and will convert to a final grade according to the grading scheme being used in the course. See Grading Policy at camosun.ca or information on conversion to final grades, and for additional information on student record and transcript notations.

Temporary Grade	Description
I	<i>Incomplete:</i> A temporary grade assigned when the requirements of a course have not yet been completed due to hardship or extenuating circumstances, such as illness or death in the family.
IP	<i>In progress:</i> A temporary grade assigned for courses that are designed to have an anticipated enrollment that extends beyond one term. No more than two IP grades will be assigned for the same course.

CW	<i>Compulsory Withdrawal:</i> A temporary grade assigned by a Dean when an instructor, after documenting the prescriptive strategies applied and consulting with peers, deems that a student is unsafe to self or others and must be removed from the lab, practicum, worksite, or field placement.
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7. Recommended Materials or Services to Assist Students to Succeed Throughout the Course

LEARNING SUPPORT AND SERVICES FOR STUDENTS

There are a variety of services available for students to assist them throughout their learning. This information is available in the College calendar, at Student Services or the College web site at camosun.ca.

STUDENT CONDUCT POLICY

There is a Student Conduct Policy **which includes plagiarism**. It is the student's responsibility to become familiar with the content of this policy. The policy is available in each School Administration Office, at Student Services and on the College web site in the Policy Section.

ADDITIONAL COMMENTS AS APPROPRIATE OR AS REQUIRED