*School of Arts & Science*
*MATHEMATICS DEPARTMENT*

**MATH 126 Section 1**
**Basic Discrete Mathematics**
**Winter 2007**

# 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: | | | |
| (b) | Office Hours: | | | |
| (c) | Location: | | | |
| (d) | Phone: | | Alternative Phone: | |
| (e) | Email: | | | |
| (f) | Website: | | | |

## 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 of compound propositions.
2.   Translate English statements into quantified logic statements.
3.   Prove set equivalences using membership, basic set identities and logical equivalences.
4.   Determine whether basic functions are surjective, injective or bijective.
5.   Describe the growth of functions using big-O, big Omega and big-Theta notation.
6.   Write simple algorithms in pseudocode.
7.   Use the fundamental concepts of number theory to solve problems concerning divisibility, prime factorization and congruences.
8.   Perform computations with matrices, including Boolean operations on zero-one matrices.
9.   Perform simple direct and indirect proofs, and proofs using mathematical induction.
10. Show how functions and sequences can be defined recursively.
11. Use permutations and combinations to solve counting and probability problems, including those in which repetition is allowed.
12. Determine whether a relation is an equivalence relation or is partially ordered.
13. Identify and describe different types of graphs and their connectivity.
14. Solve a shortest-path problem.
15. Use the concept of a tree to solve problems involving Huffman Codes and RPN.

### 3.  Required Materials

| | | |
|---|---|---|
| (a) | Texts | |
| (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.)*

| |
|---|
| |

### 5.  Basis of Student Assessment (Weighting)
*(Should be linked directly to learning outcomes.)*

**SEE BELOW**

| | | |
|---|---|---|
| (a) | Assignments | |
| (b) | Quizzes | |
| (c) | Exams | |
| (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** | *Incomplete*:  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** | *In progress*:  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** | *Compulsory Withdrawal:*  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. |

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 E-1.5 at **camosun.ca** for information on conversion to final grades, and for additional information on student record and transcript notations.

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

# Mathematics 126
## Basic Discrete Mathematics
## Winter, 2007

**Instructor:** George Ballinger
**Office:** Ewing 256
**E-mail:** ballinger@camosun.bc.ca
**Website:** ballinger.disted.camosun.bc.ca  (click the Math 126 link for course information)
**Telephone:** (250) 370-3116
**Timetable:**

| Time | Monday | Tuesday | Wednesday | Thursday | Friday |
|------|--------|---------|-----------|----------|--------|
| 8:30 am – 11:20 am | | | | | |
| 11:30 am – 12:20 pm | Math 126 Room Y217 | Math 126 Room Y217 | Math 126 Room Y217 | Math 126 Room Y217 | |
| 12:30 pm – 1:20 pm | Office Hour E256 | Office Hour E256 | Office Hour E256 | Office Hour E256 | |
| 1:30 pm – 2:20 pm | | | | | |
| 2:30 pm – 3:20 pm | Math 230 Room Y217 | Math 230 Room Y217 | Math 230 Room Y217 | Math 230 Room Y217 | |
| 3:30 pm – 4:20 pm | | | | | |
| 4:30 pm – 5:20 pm | Office Hour E256 | | Office Hour E256 | | |
| 5:30 pm – 7:50 pm | Math 072 Sec 3 Room E346 | | Math 072 Sec 3 Room E346 | | |

**Important Dates:**

| | |
|---|---|
| January 8 | First day of class |
| January 22 | Tuition fees due date |
| February 8 | Reading Break (no class) |
| March 12 | Withdrawal date deadline |
| April 9 | Easter Monday (no class) |
| April 12 | Last day of class |
| April 16-24 | Final Exam Period |

**Prerequisites:** **C** in Math 100 or Math 110.

**Exit grade:** **B+** or higher in Math 126 (or Math 110) is required for admission into Math 230 "Modern Algebra".

**C** or higher in Math 126 is required for admission into Comp 227 "Discrete and Combinatorial Structures" and Comp 210 "Data Structures and Algorithms".

**D** or higher in Math 126 will earn you transfer credit for UVic's Math 122 "Logic and Foundations" course.

| **Calendar Description:** | For students in Mathematics or Computer Science.  Topics include:  logic and proofs, set theory, number systems, relations and functions, counting techniques, algorithms, complexity and a brief introduction to graphs.  Credit will be given for only one of Math 126 or Math 222.  [3 Credits] |
|---|---|

*(Source:  Camosun College 2006-2007 Calendar http://www.camosun.bc.ca/calendar/current/web/math.html)*

| **What is Discrete Math?** | According to Wikipedia, "discrete mathematics, also called finite mathematics, is the study of mathematical structures that are fundamentally discrete, in the sense of not supporting or requiring the notion of continuity. Most, if not all, of the objects studied in finite mathematics are countable sets, such as integers, finite graphs, and formal languages." |
|---|---|

*(Source:  Wikipedia 01/07 http://en.wikipedia.org/wiki/Discrete_mathematics)*

**Required Textbook:**   K.H. Rosen, *Discrete Mathematics and Its Applications*, Sixth Edition, McGraw-Hill, Boston, 2007.

**Course Content:**

*Chapter 1   The Foundations:  Logic and Proofs*
     1.1   Propositional Logic
     1.2   Propositional Equivalences
     1.3   Predicates and Quantifiers
     1.4   Nested Quantifiers
     1.5   Rules of Inference
     1.6   Introduction to Proofs
     1.7   Proof Methods and Strategy
*Chapter 2   Basic Structures:  Sets, Functions, Sequences, and Sums*
     2.1   Sets
     2.2   Set Operations
     2.3   Functions
*Chapter 3   The Fundamentals:  Algorithms, the Integers, and Matrices*
     3.1   Algorithms
     3.2   The Growth of Functions
     3.3   Complexity of Algorithms
     3.4   The Integers and Division
     3.5   Primes and Greatest Common Divisors
     3.6   Integers and Algorithms
*Chapter 4   Induction and Recursion*
     4.1   Mathematical Induction
     4.2   Strong Induction and Well-Ordering
     4.3   Recursive Definitions and Structural Induction
*Chapter 5   Counting*
     5.1   The Basics of Counting
     5.2   The Pigeonhole Principle
     5.3   Permutations and Combinations
     5.4   Binomial Coefficients
     5.5   Generalized Permutations and Combinations
*Chapter 6   Discrete Probability*
     6.1   An Introduction to Discrete Probability
*Chapter 7   Advanced Counting Techniques*
     7.1   Recurrence Relations
     7.2   Solving Linear Recurrence Relations
*Chapter 9   Graphs*
     9.1   Graphs and Graph Models
     9.2   Graph Terminology and Special Types of Graphs
     9.3   Representing Graphs and Graph Isomorphism
     9.4   Connectivity
     9.5   Euler and Hamilton Paths
*Chapter 10  Trees*
     10.1  Introduction to Trees
     10.2  Applications of Trees

[Note:  Some topics may be omitted.]

**A&S Math Lab:**  Ewing 224:  This drop-in centre is freely available for your use to work on math homework and to seek help from the tutor on staff (see hours posted on door).

**Study Time:**  It is recommended that approximately 6-10 hours per week be spent studying for this course outside of class time.

**Calculator Policy:**  As per Math Department policy, the only calculator permitted for use on tests and the final exam is the Sharp EL-531W scientific calculator.  No other make/model of calculator is permitted, nor are other electronic devices such as cell phones, PDAs, laptop computers, MP3 players, electronic translators, etc.

**Homework:**  There will be approximately eight assignments to be handed in for marking, details for which will be posted on the course website.  LATE ASSIGNMENTS WILL NOT BE ACCEPTED.

**Tests:**  There will be three term tests, details for which will be posted on the course website.

**Final Exam:**  A comprehensive final exam will take place during the final exam period of April 16-24.  The specific date, time, and location will be announced sometime in February.  You must write the final exam at this time as per Camosun College's policy on final examinations.  See http://www.camosun.bc.ca/calendar/2006/pdf_version/academic.pdf.

**Grade Calculation:**  The final grade will be calculated according to the following breakdown:

Assignments (approx. 8):  14%*
Three Term Tests:  36%
Final Exam:  50% or 100%**

*Note:*  The lowest assignment mark will be dropped when calculating the assignment average.  This allows you to miss one assignment without penalty.

** *Note:*  If your final exam mark is higher than your term mark (which consists of the assignments and term tests) AND your term mark is at least 50%, then your course mark will be based entirely on your final exam mark.

**Grade Scale:**  Final letter grades are assigned as follows:

| 0-49 | 50-59 | 60-64 | 65-69 | 70-74 | 75-79 | 80-84 | 85-89 | 90-94 | 95-100 |
|------|-------|-------|-------|-------|-------|-------|-------|-------|--------|
| F | D | C | C+ | B– | B | B+ | A– | A | A+ |

For information on Camosun College's grading policy, see http://www.camosun.bc.ca/policies/Education-Academic/E-1-Programming-&-Instruction/E-1.5.pdf.