UNIVERSITY OF THE FRASER VALLEY

ORIGINAL COURSE IMPLEMENTATION DATE: September 1999
REVISED COURSE IMPLEMENTATION DATE: September 2019
COURSE TO BE REVIEWED: (six years after UEC approval) December 2024
Course outline form version: 09/15/14

OFFICIAL UNDERGRADUATE COURSE OUTLINE FORM

Note: The University reserves the right to amend course outlines as needed without notice.

Course Code and Number: MATH 225	**Number of Credits:** 3 Course credit policy (105)
Course Full Title: Topics in Discrete Mathematics **Course Short Title (if title exceeds 30 characters):**	
Faculty: Faculty of Science	**Department (or program if no department):** Mathematics & Statistics

Calendar Description:

Introduces students to some of the most useful types of combinatorial structures: graphs, trees, generating functions, and recurrence relations, all of which play an important role in the mathematics of computers and computation.

Prerequisites (or NONE):	C+ or better in either MATH 112 or MATH 118.
Corequisites (if applicable, or NONE):	
Pre/corequisites (if applicable, or NONE):	

Equivalent Courses (cannot be taken for additional credit)
Former course code/number: MATH 243
Cross-listed with:
Equivalent course(s):
Note: Equivalent course(s) should be included in the calendar description by way of a note that students with credit for the equivalent course(s) cannot take this course for further credit.

Transfer Credit
Transfer credit already exists: ☒ Yes ☐ No
Transfer credit requested (OReg to submit to BCCAT):
☐ Yes ☒ No (if yes, fill in transfer credit form)
Resubmit revised outline for articulation: ☐ Yes ☒ No
To find out how this course transfers, see **bctransferguide.ca**.

Total Hours: 50
Typical structure of instructional hours:

Lecture hours	50
Seminars/tutorials/workshops	
Laboratory hours	
Field experience hours	
Experiential (practicum, internship, etc.)	
Online learning activities	
Other contact hours:	
Total	**50**

Special Topics
Will the course be offered with different topics?
☐ Yes ☒ No
If yes, different lettered courses may be taken for credit:
☐ No ☐ Yes, repeat(s) ☐ Yes, no limit
Note: The specific topic will be recorded when offered.

Maximum enrolment (for information only): 36

Expected frequency of course offerings (every semester, annually, every other year, etc.): annually

Department / Program Head or Director: Ian Affleck	**Date approved:**	August 21, 2017
Faculty Council approval	**Date approved:**	October 5, 2018
Campus-Wide Consultation (CWC)	**Date of posting:**	November 16, 2018
Dean/Associate VP: Lucy Lee	**Date approved:**	October 5, 2018
Undergraduate Education Committee (UEC) approval	**Date of meeting:**	December 14, 2018

Learning Outcomes

Upon successful completion of this course, students will be able to:

1. Clearly state, interpret, and employ definitions and major theorems;
2. Use basic counting techniques such as addition rule, multiplication rule, and inclusion/exclusion rule;
3. Analyze and count permutations and combinations;
4. Construct generating functions and apply them to counting problems;
5. Solve first order linear and second order linear homogeneous recurrence relations;
6. Construct chromatic polynomials for graphs;
7. Apply some standard graph theory algorithms (Dijkstra's shortest path, maximum matching, minimum weight spanning tree, etc) to solve practical problems.

Prior Learning Assessment and Recognition (PLAR)

☒ Yes ☐ No, PLAR cannot be awarded for this course because

Typical Instructional Methods (guest lecturers, presentations, online instruction, field trips, etc.; may vary at department's discretion)

This course will be primarily lecture-based. Evaluation will include quizzes, tests, assignments and a final exam.

Grading system: Letter Grades: ☒ Credit/No Credit: ☐ Labs to be scheduled independent of lecture hours: Yes ☐ No ☐

NOTE: The following sections may vary by instructor. Please see course syllabus available from the instructor.

Typical Text(s) and Resource Materials (if more space is required, download Supplemental Texts and Resource Materials form)

	Author (surname, initials)	Title (article, book, journal, etc.)	Current ed.	Publisher	Year
1.	Grimaldi, Ralph	Discrete and Combinatorial Mathematics, 5th Ed	☐	Pearson	
2.			☐		
3.			☐		
4.			☐		
5.			☐		

Required Additional Supplies and Materials (software, hardware, tools, specialized clothing, etc.)

Typical Evaluation Methods and Weighting

Final exam:	45%	Assignments:	15%	Midterm exam:	%	Practicum:	%
Quizzes/tests:	40%	Lab work:	%	Field experience:	%	Shop work:	%
Other:	%	Other:	%	Other:	%	Total:	100%

Details (if necessary): In order to pass the course, a student must achieve 40% or higher on the final exam.

Typical Course Content and Topics

1. Counting
   a. The addition rule and multiplication rule
   b. The inclusion and exclusion rule
   c. Combinations and permutations
2. Generating Functions
   a. Definition and examples
   b. Partitions of integers
3. Recurrence Relations
   a. The first-order linear recurrence relation
   b. The second-order linear homogeneous recurrence relation
   c. The method of generating functions
4. Graph Theory and Applications
   a. An introduction to graph theory
   b. Basic structures: paths and cycles
   c. Graph colouring and chromatic polynomials
   d. Trees
   e. Algorithms: shortest path, minimal spanning trees and maximal matchings