UNIVERSITY OF THE FRASER VALLEY

ORIGINAL COURSE IMPLEMENTATION DATE: September 1999
REVISED COURSE IMPLEMENTATION DATE: September 2026
COURSE TO BE REVIEWED (six years after UEC approval)**:** December 2031
Course outline form version: 29/08/2024

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:** Topics in Discrete Mathematics	
Faculty: Faculty of Science	**Department/School:** 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 one of MATH 112 or MATH 118) or (MATH 125 and C or better in one of MATH 112 or MATH 118).
Corequisites (if applicable, or NONE):	None.
Pre/corequisites (if applicable, or NONE):	None.

Antirequisite Courses *(Cannot be taken for additional credit.)*

Former course code/number:

Cross-listed with:

Equivalent course(s):

(If offered in the previous five years, antirequisite course(s) will be included in the calendar description as a note that students with credit for the antirequisite course(s) cannot take this course for further credit.)

Typical Structure of Instructional Hours

Lecture/seminar	50
Total hours	**50**

Scheduled Laboratory Hours

Labs to be scheduled independent of lecture hours: **No**

Course Details

Special Topics course: **No**
(If yes, the course will be offered under different letter designations representing different topics.)

Directed Study course: **No**
(See policy 207 for more information.)

Grading System: **Letter grades**

Delivery Mode: **May be offered in multiple delivery modes**

Expected frequency: **Annually**

Maximum enrolment (for information only)**: 36**

Prior Learning Assessment and Recognition (PLAR)

PLAR is available for this course.

Transfer Credit *(See bctransferguide.ca.)*

Transfer credit already exists: **Yes**

Submit outline for (re)articulation: **No**
(If yes, fill in transfer credit form.)

Department approval	**Date of meeting:**	June 16, 2025
Faculty Council approval	**Date of meeting:**	September 5, 2025
Undergraduate Education Committee (UEC) approval	**Date of meeting:**	December 19, 2025

Learning Outcomes *(These should contribute to students' ability to meet program outcomes and thus Institutional Learning Outcomes.)*

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

1. Use definitions and major theorems related to course topics.
2. Use basic counting techniques such as addition rule, multiplication rule, and general inclusion/exclusion rule.
3. Calculate permutations and combinations.
4. Construct generating functions and apply them to counting problems.
5. Solve first order linear and second order linear recurrence relations, both homogeneous and nonhomogeneous.
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.

Recommended Evaluation Methods and Weighting *(Evaluation should align to learning outcomes.)*

Final exam:	45%	Quizzes/tests/midterm:	40%	Assignments:	15%
	%		%		%

Details:

Students must obtain at least 40% on the final exam in order to pass this course.

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

Typical Instructional Methods *(Guest lecturers, presentations, online instruction, field trips, etc.)*

Lecture

Texts and Resource Materials *(Include online resources and Indigenous knowledge sources. Open Educational Resources (OER) should be included whenever possible. If more space is required, use the Supplemental Texts and Resource Materials form.)*

	Type	Author or description	Title and publication/access details	Year
1.	Textbook	Grimaldi	Discrete and Combinatorial Mathematics, 5th Ed	2010
2.	Textbook	Rosen	Discrete Mathematics and Its Applications, 8th Ed	2018
3.				
4.				
5.				

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

Course Content and Topics

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 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