UNIVERSITY COLLEGE OF THE FRASER VALLEY

COURSE INFORMATION

DISCIPLINE/DEPARTMENT: Mathematics **IMPLEMENTATION DATE**: Fall 1999

Revised:

MATH 225	Topics in Discrete Mathematics	3
SUBJECT/NUMBER OF COURSE CREDITS	**DESCRIPTIVE TITLE**	**UCFV**

CALENDAR DESCRIPTION: This course introduces the student to some of the most useful types of "combinatorial structures," e.g., graphs, trees and recurrence relations, all of which play an important role in the mathematics of computers and computation. Topics include recurrence relations, asymptotics, graphs and digraphs, trees, and applications.

RATIONALE: See the rationale for the introduction of Math 125. Students with the maturity provided by Math 125 should find the ideas and applications of the Math 225 syllabus more easily understood (than is the case in Math 243), and more exciting. Mathematics and CIS are both interested in attracting as many students as possible to these important and useful courses.

COURSE PREREQUISITES: Math 125

COURSE COREQUISITES: None

HOURS PER TERM FOR EACH STUDENT	**Lecture**	**60**	**hrs**	**Student Directed Learning**	**hrs**
	Laboratory		**hrs**	**Other - specify:**	
	Seminar		**hrs**		**hrs**
	Field Experience		**hrs**	**TOTAL** **60**	**HRS**

MAXIMUM ENROLMENT: 35

Is transfer credit requested? : **Yes** **9** **No**

AUTHORIZATION SIGNATURES:

Course Designer(s): G. Schlitt **Chairperson**:

(E. Davis) **Curriculum Committee**

Department Head: S. Milner **Dean**: W. Welsh

PAC: Approval in Principle **PAC: Final Approval**: October 23, 1996

MATH 225
NAME & NUMBER OF COURSE

SYNONYMOUS COURSES:

(a) replaces Math 243
(course #)

(b) cannot take _____ for further credit
(course #)

SUPPLIES/MATERIALS:

Access to computing labs with Maple license.

TEXTBOOKS, REFERENCES, MATERIALS (List reading resources elsewhere)

Ross & Wright, Discrete Mathematics, Prentice Hall, 1985
Biggs, Discrete Mathematics, OUP, 1991
Tucker, Applied Combinatorics, 1984
Graham, Knuth, Patashnik, Concrete Mathematics, Addison-Wesley, 1989

OBJECTIVES:

The objective is to introduce the student to several of the most important combinatorial objects, graphs, trees, and recurrence relations. Students should be able to recognize when these structures occur in other contexts, especially the context of applied computer science, and analyse them.

METHODS:

The course will be primarily lecture based, but the students should be given frequent opportunity to implement the ideas and techniques discussed in a computer environment, e.g., Maple. Individual student research will be encouraged through the use of term projects.

STUDENT EVALUATION PROCEDURE:

Instructors have discretion over this, but a likely breakdown would see in-term exams, frequent assignments, a final exam, as well as one or two term projects.

Typically, the final exam would count for 35% of the mark, in-term exams for 25%, and assignments and projects for 40%.

Math 225
NAME & NUMBER OF COURSE

COURSE CONTENT

Combinatorial analysis: (5 weeks)
- (a) Asymptotics, algorithms, recursion, complexity
- (b) generating functions: limits, sums, infinite sums, partitions
- (c) recurrence relations: first order linear, second order linear

Set theory: (1 weeks)
- (a) functions, equivalence relations, partitions

Graph theory: (3 weeks)
- (a) definitions, representations (adjacency matrices, etc.)
- (b) components, paths, cycles, degrees
- (c) digraphs
- (d) hamiltonian cycles, eularian cycles
- (e) shortest-path algorithms

Trees: (4 weeks)
- (a) trees, rooted trees, binary trees
- (b) spanning trees, minimum spanning trees
- (c) tree transversals
- (d) applications of trees