UNIVERSITY COLLEGE OF THE FRASER VALLEY

COURSE INFORMATION

DEPARTMENT: MATHEMATICS **IMPLEMENTATION DATE:** Sept. 1993

Mathematics 308	Linear Programming	3
NAME & NUMBER OF COURSE	DESCRIPTIVE TITLE	UCFV CREDIT

CATALOGUE DESCRIPTION:

An introduction to the theory and applications of linear programming. Topics include: the geometry of linear programs, duality, the simplex method, networks, applications of duality.

COURSE PREREQUISITES: Math 221 or Math 114. A C+ or better or recommended in Math 114.

COURSE COREQUISITES:

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

UCFV CREDIT TRANSFER | **UCFV CREDIT NON-TRANSFER** | **NON-CREDIT**

TRANSFER STATUS (Equivalent, Unassigned, Other Details)

UBC credits TBA

SFU credits TBA

UVIC units TBA

Other

Math Cirr. Committee — **COURSE DESIGNER**

J.D. TUNSTALL Ph.D. — **DEAN OF ACADEMIC STUDIES**

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COURSES FOR WHICH THIS IS A PREREQUISITE:	**RELATED COURSES**
None	**Math 343**

TEXTBOOKS, REFERENCES, MATERIALS (List reading resources elsewhere)

TEXTS: **Linear Programming, V. Chvatal and W.H. Freeman.**

OBJECTIVES: **The student will be provided with the resources to recognize, set up and solve linear programming problems as they occur in the sciences, economics, business, and other areas. The course will be primarily lecture-based, with some use of micro-computer resources for several assignments.**

METHODS:

STUDENT EVALUATION PROCEDURE:

Students will write 2 to 3 midterm exams during the semester, as well as a cumulative final exam. They will also be expected to turn in assignments periodically. The approximate weightings will be as follows:

Midterm exams	**40%**
Final exams	**40%**
Assignments	**20%**

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COURSE CONTENT

1. **Introduction**
   - a) **Optimization and mathematical programming**
   - b) **Linear programming - formulation**
   - c) **The geometry of linear programs**

2. **Mathematical Prerequisites**
   - a) **Linear Algebra**
   - b) **Convex sets**

3. **Duality Theory**
   - a) **An example of dual linear programs**
   - b) **Transformations among various forms of the linear program**
   - c) **The dual problem and its properties**
   - d) **The duality theorem**
   - e) **Complementary slackness**

4. **The Simplex Method**
   - a) **Extreme points and basic feasible solutions**
   - b) **The optimality theorem**
   - c) **Pivoting to a new basic feasible solution**
   - d) **Degeneracy and cycling. Multiple optima**
   - e) **Computational aspects**
   - f) **Geometric interpretation**
   - g) **Artificial variables and the two-phase method**
   - h) **The revised simplex method**
   - i) **The dual simplex method**
   - j) **Computation comparisons among the various versions of the simplex methods**

5. **Case Problems**

6. **Postoptimality Problems**
   - a) **Sensitivity Analysis**
   - b) **Parametric programming**

7. **Special Linear Programs**
   - a) **The transportation problem**
   - b) **The transportation algorithm**
   - c) **Network flows**