UNIVERSITY COLLEGE OF THE FRASER VALLEY

COURSE INFORMATION

DEPARTMENT: Mathematics **IMPLEMENTATION DATE:** January 1994

Math 460	Operations Research II (stochastic)	3
NAME & NUMBER OF COURSE	**DESCRIPTIVE TITLE**	**UCFV CREDIT**

CATALOGUE DESCRIPTION: The application of mathematical methods problems in industry and business, allowing for random occurrence. Topics covered include: decisions under uncertainty; renewal theory, stochastic inventory control; Markov chains; queueing models, networks of queues; Markov decision processes, waiting lines; simulations reliability.

COURSE PREREQUISITES: Math 270, Math 360

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**

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

TRANSFER STATUS (Equivalent, Unassigned, Other Details)

UBC credits

SFU credits

UVIC units

Other

Math Curriculum Committee	**J.D. TUNSTALL Ph.D.**
COURSE DESIGNER	**DEAN OF ACADEMIC STUDIES**

Math 460 - Operations Research II (stochastic)
NAME & NUMBER OF COURSE

COURSES FOR WHICH THIS IS A PREREQUISITE: None	RELATED COURSES Math 360

TEXTBOOKS, REFERENCES, MATERIALS (List reading resources elsewhere)

TEXTS: **Hillier & Lieberman, Introduction to stochastic models in operations research. (1990) McGraw Hill (includes 2 3.5" disks)**

REFERENCE: **S. Ross, introduction to probability models, 4th edition, (1991), Academic Press.**

OBJECTIVES:

1. **To introduce the students to the fundamental probabilistic models in applied operations research.**
2. **To develop the students' skills in formulating stochastic models in a business and industrial context.**
3. **To familiarize the students with using computers to solve operational research problems in business and industry.**

METHODS:

STUDENT EVALUATION PROCEDURE:

Assignments	**20%**
Mid-term exams	**30%**
Quizzes and short tests	**10%**
Final Examination	**40%**

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COURSE CONTENT

1. **Review of probability theory.**
2. **Decisions under uncertainty, decision trees, utility theory, Bayesian analysis.**
3. **Random variables, discrete and continuous variables, moment generating functions, limit theorems, stochastic processes.**
4. **Renewal theory: renewal and renewal-reward processes, regenerative processes.**
5. **Applications of renewal processes: stochastic inventory control, machine maintenance problems.**
6. **Markov chains: Chapman-Kolmogorov equations, limiting probabilities.**
7. **Queuing models: M/M/1, M/G/1 systems. Variations on single server systems.**
8. **Multiserver queues: M/M/k, M/G/k systems. Network of queues.**
9. **Applications of queuing models: assembly line problems, telecommunications problems, traffic control problems.**
10. **Markov decision processes, policy improvement algorithm, value iteration algorithm.**
11. **Applications of Markov decision processes: inventory control and scheduling problems, optimization problems, in waiting lines.**
12. **Simulations: techniques for simulating random variables, reducing variance and determining the number of runs.**
13. **Reliability theory: systems with independent components, systems with repair.**