IOE 616 **Queueing Theory** Fall, 2002

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Course Description: This is a course on the theoretical foundations, models and techniques of queueing theory. Elementary through advanced queueing systems and networks will be covered. The requisite stochastic processes background material will be developed as the course progresses. The approach will be rigorous, but not at the expense of intuitive understanding.

Prerequisites: IOE 515 (Stochastic Processes) or equivalent

Texts: Leonard Kleinrock and Richard Gail, Queuing Systems: Problems and Solutions, Wiley Interscience, NY, 1996.

Sheldon Ross, Applied Probability Models with Optimization Applications, Dover, 1995. **R**

Recommended Text: Leonard Kleinrock, Queueing Systems, Volume 1: Theory, Wiley, 1975. **K**

References: Wolff, R., Stochastic Modeling and the Theory of Queues, Englewood Cliffs, NJ, 1989.

Donald Gross and Carl Harris, Fundamentals of Queueing Theory, Second Edition Wiley, 1985.

Robert Cooper, Introduction to Queueing Theory, Second Edition North Holland, 1981.

Walter Giffin, Queueing: Basic Theory and Applications, Grid, 1978.

Jean Walrand, Introduction to Queueing Networks, Prentice-Hall, Englewood Cliffs, 1988.

William Feller, An Introduction to Probability Theory and its Applications, Volumes 1 and 2, Wiley, 1968, 1971.

Daniel Heyman and Matthew Sobel, Stochastic Models in Operations Research, Vol. l, McGraw Hill, New York, 1982.

Sheldon Ross, Stochastic Processes, 2nd edition, Wiley, 1996.

Grading Policy:	Exam 1 (Th, Oct 10)	40%
	Exam 2 (Tu, Dec 10)	40%
	Homework	20%

TOPIC	READING
Introduction	**K**: 1.1-1.2
Background	
Semi-Markov and Markov Renewal Processes	**R**: 5.1-5.2
Regenerative Processes and Long Run Probabilities	**R**: 5.4
Random Walks and the G/G/1 Queue	**R**: 5.5
Applications to the M/M/1, M/G/1, and G/M/m Queues	**R**: 5.6
Little's Formula	**R**: 5.5
Continuous Time Markov Chains and Markovian Queues	**R**: 5.8
Transforms and Transient Behavior of the M/M/1 Queue	**K**: Appendix I
Birth/Death Processes and the M/M/m Queue	**R**: 5.9
Elementary Queueing Theory	
M/M/1 Queue and Its Variants	**K**: 3.1-3.2, 3.4-3.10
General Markovian Queues - Bulk, Parallel, and Series	**K**: 4.1-4.7
Networks of Queues	**K**: 4.8
Intermediate Queueing Theory	
M/G/1 Queue	**K**: 5.1-5.7
Busy Period Analysis	**K**: 5.8-5.9

G/M/m Queue	**K**: 6.1-6.5
Advanced Queueing Theory	
G/G/1 Queue	**K**: 7.1-7.2, 8.1, 8.4
Priority Queues	-

COURSE POLICIES:

Homework:

Students are allowed to work in groups on homework. However each student is individually responsible for expressing their answers in their own terms. Also you may not acquire, read, or otherwise utilize answers from solutions handed out in previous terms. Homework is due at the beginning of class one week after it is assigned. Late homework will not be accepted.

Exams:

a) Please note the exam times above. Valid excuses for failing to meet an exam are personal illness or illness in your immediate family. You must observe the *CoE Honor Code* (see http://honor.personal.engin.umich.edu/code.php) with respect to examinations and all other aspects of this course.

b) If you believe an exam question was graded in error and wish to have the exam regraded, you must submit the exam to the Instructor together with a *written* explanation for requesting the regrade. This must be done within *one week* from the date the exam was returned. Be aware that an exam that is regraded will result in *all* of the graded problems being regraded so that you may lose or gain points by resubmitting.