

## Performance Analysis of Computer Networks (Winter, 2004)

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CRN	20315
Course Number	ECE-C632
Section Number	501
Credits	3.0
Time	Thursdays 6pm - 8:50pm
Room	Curtis Hall 457
Instructor	Steven Weber
Restrictions	ECE-C631
Department	Electrical and Computer Engineering

### Description

Covers probability theory and its applications to networks, random variable and random processes; Markov chains, multi-dimensional Markov chains;  $M/M/1$ ,  $M/M/m$ ,  $M/M/m/m$ ,  $M/G/1$  and  $G/G/1$  queueing systems and their applications in computer networks; analysis of networks of queues: Kleinrock Independence Approximation; Time-reversibility and Burke's theorem; Jackson's theorem; the phenomenon of long-range dependence and its implications in network design and traffic engineering.

### Textbook

Primary text (required)

Title	Fundamentals of Queueing Theory
Authors	Donald Gross and Carl Harris
Publisher	Wiley Series in Probability and Statistics
ISBN	0471170836
Edition	3 <sup>rd</sup>

Supplemental texts (optional)

Title	Probability and Random Processes for Electrical Engineering
Authors	Albert Leon-Garcia
Publisher	Prentice-Hall
ISBN	020150037X
Edition	2 <sup>nd</sup>

Title	Multiservice Loss Models for Broadband Telecommunication Networks
Authors	Keith Ross
Publisher	Springer
ISBN	3540199187
Edition	1 <sup>st</sup>

Title	Network Calculus
Authors	Jean-Yves Le Boudec
Publisher	Springer-Verlag
ISBN	354042184X
Edition	1 <sup>st</sup>

I will review probability, stochastic processes, and Markov chains using Leon-Garcia as a reference, but you do not need to purchase the text, provided you have a reasonably good reference available that covers the same material, e.g., Papoulis. I will make copies of the relevant chapters from Ross and have them available for download off the course website. The Le Boudec text may be downloaded at [http://ica1www.epfl.ch/PS\\_files/NetCal.htm](http://ica1www.epfl.ch/PS_files/NetCal.htm), we will only be using Chapter 1.

## Grading

Homework (one problem set per week)	30%
Midterm Exam (comprehensive)	30%
Final Exam (comprehensive)	40%

## Homework and Makeup Exams

Makeup exams are only available if you are unable to attend due to a severe health problem or a death in your family. Homeworks are due at the **beginning** of class, one week following the class in which they were assigned. Late homeworks will not be accepted.

## Final Exam Location and Time

The university has promised to announce the final examination schedule during the third week of class. Do not make vacation travel plans which might interfere with the course until the examination time has been announced.

## Students with Disabilities

In accordance with Drexel University policy, any student with a documented disability who needs accommodations is encouraged to contact the Office of Disability Services (215-895-1401) or speak directly to the professor for further information about this office. Students must register with the Office of Disability Services and receive an Accommodation Verification Form prior to receiving accommodations. Contact with the Office of Disability Services is strictly confidential. Please make contact as early in the term as possible in order to receive timely accommodations.

## Mandatory Registration

All students sitting in the classroom during the class **must** be registered for the course and on the class list supplied to the instructor for the second class. Any student not on the list at that time will be asked to leave until proper registration is obtained.

## Academic Dishonesty

The Drexel University policy on academic dishonesty may be found at <http://www.drexel.edu/studentlife/studenthandbook2002/judicial/acadhon.html> and will be strictly enforced. **Plagiarism, fabrication, and cheating will, at the discretion of the instructor, constitute grounds for failure of the course.**

## Course Calendar

**Important:** Please read the material for the lecture **before** the class in which it is covered.

Class #	Date	Subject	Text Chapters
1	Thursday, January 8	Probability Review	Leon-Garcia, Chapters 2-5
2	Thursday, January 15	Stochastic Processes Review	Leon-Garcia, Chapters 6-7
3	Thursday, January 22	Markov Chains Review	Leon-Garcia, Chapter 8
4	Thursday, January 29	Simple Markovian Birth-Death Queueing Models	Gross & Harris, Chapter 2
5	Thursday, February 5	<b>Midterm Exam</b>	N/A
6	Thursday, February 12	Advanced Markovian Queueing Models	Gross & Harris, Chapter 3
7	Thursday, February 19	Networks, Series, and Cyclic Queues	Gross & Harris, Chapter 4
8	Thursday, February 26	The Stochastic Knapsack	Ross, Chapters 2-3
9	Thursday, March 4	Admission Control and Product Form Loss Networks	Ross, Chapters 4-5
10	Thursday, March 11	Network Calculus	Le Boudec, Chapter 1
11	Thursday, March 18	<b>Final Exam</b>	N/A