Standard Course Syllabus

Department of Electrical and Computer Engineering (ECE)

861	Computer Communication Networks I

ABET Classification

This course is available for Graduate Credit only. It cannot be used for UG credit.

Catalog Description

A foundational and analytical understanding of network architecture, error control, queuing analysis, and network dimensioning.

Level	**Credits**	**Class Meeting Pattern** (For example, "3 cl." means 3, 48-min classes per week.)
G	3	3 cl.

Course Prerequisites

Prereq: Math 530 or Stat 428 or Stat 520 or ECE 804 or permission of instructor.

Quarters of Offering

Wi Qtr.

General Info, Cross-listings, Exclusions, etc.

Cross-listed with: CS&E

General Info: Background in probability theory expected.

Exclusion: Not open to students with credit for ECE 894G or CSE 894G.

Courses that require this as a direct prerequisite: 862

Prereq by topic: A graduate or advanced undergraduate probability theory course.

Learning Outcomes (with ABET Criterion 3 Student Outcomes for Undergraduate Courses)

A student taking this course is expected to:
1. Be exposed to a basic history of networking
2. Be familiar with architectural concepts of layering and circuit and packet switching
3. Master various error control techniques and their analyses
4. Be familiar with different queuing models and their application to networking
5. Master elementary Markov chain analysis and be able to use them to model network systems
6. Be familiar to M/G/1 queues, residual lifetime, and priority queuing
7. Be familiar with Jackson's Theorem and product form analyses
8. Be familiar with Little's Law and use it in different network scenarios
9. Master concepts of shortest path routing and use Dijkstra and Bellman Ford on different network graphs
10. Be familiar with issues of convergence, looping, and overhead in routing

Text(s) and Other Course Materials	**Author(s)**	**Publisher**
Telecommunication Networks: Protocols, Modeling, and Analysis, 1987 (cross-listed with CS&E)	M. Schwartz	Addison Weslev
Communication Networks, Fundamental Concepts and Key Architectures, 2nd Ed. (cross-listed with CS&E)	A. Leon-Garcia and I. Widjaja	McGraw-Hill

Standard Course Syllabus
Department of Electrical and Computer Engineering (ECE)

861	Computer Communication Networks I

References (supplemental reading)

[1] D. Bertsekas and R. Gallager, "Data Networks," 2nd Ed., Prentice Hall, 1992 (ISBN-10: 0132009161)

[2] Anurag Kumar, D. Manjunath, Joy Kuri, D. Manjunath, "Communication Networking: An Analytical Approach," The Morgan Kaufmann Series in Networking, May 2004.

[3] James F. Kurose, Keith W. Ross, "Computer Networking: A Top-Down Approach Featuring the Internet," 4th Ed., Addison Wesley.

[4] R. Wolff, "Stochastic Modeling and the Theory of Queues," Prentice Hall, 1989.

[5] L. Kleinrock, "Queuing Systems, Vol I," John Wiley, 1975.

[6] G. Kesidis, "Introduction to Analysis of Communication Networks," Wiley-Interscience, 2007.

Topics and (# of Lectures)

Historical perspective in networking (2)
Circuit/packet switching and statistical multiplexing (1)
Importance of layering for network architecture (2)
Important problems in networking (1)
Description of error detection, correction, and recovery mechanisms (2)
Analysis of error recovery mechanisms (3)
Causes of network delay and queuing nomenclature (1)
Arrival processes: properties of Poisson Processes (3)
Elementary Markov Chain analysis (3)
Applications of Markov Chain to telecommunication and data networks (1)
M/G/1 analysis (2)
Residual lifetime and priority queuing (2)
Jackson's Theorem and product form analysis (2)
Applications to network dimensioning, statistical multiplexing, and admission control (1)
Shortest path and distance vector based routing (1)
Bellman Ford and Dijkstra's algorithms (1)
Relationship to dynamic programming and analysis (2)

Representative Lab Assignments

n/a

Grading Plan

Homework assignments 25%
Project 25%
Final exam 50%

Relationship to ABET Criterion 3 Student Outcomes (a-k)

Grad only. N/A.

Relationship to Additional ABET Student Outcomes

Course Supervisor: Shroff, Ness
Date of Approval of Standard Syllabus by Area: 04/22/09
Most Recent Course Evaluation:
Most Recent Area Review: