Standard Course Syllabus

Department of Electrical and Computer Engineering (ECE)

862	Computer Communication Networks II

ABET Classification

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

Catalog Description

Foundational understanding of network analysis, routing, control, multi-access, and their examples in the context of the existing communication networks.

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

Course Prerequisites

Prereq: 861 or permission of instructor.

Quarters of Offering

Sp Qtr.

General Info, Cross-listings, Exclusions, etc.

Cross-listed with: CS&E

General Info: n/a

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

Courses that require this as a direct prerequisite: none

Prereq by topic: An analytical networking course covering basics of error control, queuing, and routing.

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

A student taking this course is expected to:
1. Master concepts in shortest path routing including analysis of correctness, convergence, and complexity
2. Be familiar with asynchronous routing protocols, routing on the Internet, and routing on other historical networks.
3. Be familiar with window-based flow control and its analysis using closed queueing networks
4. Be familiar with TCP congestion control and its advantages and disadvantages.
5. Be exposed to a simplified analysis of TCP/IP window control
6. Be familiar to the concepts of multi-access communications
7. Be familiar to polling and analyses of polled systems
8. Master simplified analysis of Aloha and slotted Aloha
9. Be exposed to other historical and current random-access techniques
10. Be familiar with P2P networks and their analysis.
11. Be exposed to some of the open research problems in networking.

Text(s) and Other Course Materials	**Author(s)**	**Publisher**
Communication Networks, Fundamental Concepts and Key Architectures, 2nd Ed. (MSH from 861) (cross-listed with CS&E)	A. Leon-Garcia and I. Widjaja	McGraw-Hill
Telecommunication Networks: Protocols, Modeling, and Analysis, 1987 (MSH from 861) (cross-listed with CS&E)	M. Schwartz	Addison Weslev

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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)
Review of routing fundamentals (1)
Convergence of asynchronous routing protocols (2)
Routing on the Internet (3)
Window based versus rate based flow control (1)
Analysis of fixed window flow control Norton's Theorem (2.5)
Engineering analysis of SNA and other historical window flow control mechanisms (1.5)
TCP/IP congestion control description (2)
Advantages and limitations of TCP congestion control (1)
Simplified analysis of TCP/IP window control (2)
Polling and scheduling description and analysis (3)
Random access description and analysis (3)
Applications of random access (2)
Motivation and functionality (1)
Classification of P2P networks (1)
Description on simplified analysis of Bit Torrent (2)
Open research problems (2)

Representative Lab Assignments
n/a

Grading Plan
Homework assignments 20%
Simulation project 20%
Paper reading project 20%
Final exam 40%

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: