ENEE 756: Computer Networks

- Credit Hours: 3
- Course Level: Graduate
- Instructor: Dr. Charles B. Silio
- Number of Lecture Hours: Thirty 75-minute classes plus 120 minute final exam

Course Prerequisites:

ENEE 324 or equivalent; and ENEE 646.

Course Objectives:

To study the principles, design, evaluation, and use of computer networks, especially local area networks and high speed ring networks.

Course Description:

This course will cover various aspects of computer networks including the ISO open systems reference model, protocol layers, channel coding, data communication concepts, local area network (LAN) topologies and transmission media, basic queueing theory applied to LAN performance modeling, LAN access techniques, network interconnections, network reliability, and network security. Recent performance analysis work in the area of token and circuit-switched rings and reliability of fiber optic ring networks will also be covered.

Topical Outline:

- Layered Network Architecture (OSI Model)
- Physical Layer, digital communication, coding modulation, and media
- Data Link Layer and medium access control protocols
- Network Layer, Virtual Circuits and Datagrams, and routing
- Local Area Networks (IEEE 802 and FDDI)
- Ring networks versus CSMA/CD, performance models and comparisons
- Transport Layer and TCP
- Internetworking and IP
- Higher Layer
- Network Reliability
- Network Security

Course Requirements:

- Homeworks: Policy announced by instructor.
- Exams: One midterm exam and a final exam.
- Term paper/project: Each student will choose a topic in networking, will research literature on the topic and write and present a term paper on the subject.
- Computer Facilities: General purpose computational support for homework.

References:

1. G. E. Keiser,*Local Area Networks*, New York, NY, McGraw-Hill, Inc., 1989, ISBN: 0-07-033561-3.
2. D. Comer, *Internetworking with TCP/IP Volume I: Principles, Protocols, and Architecture*, 3rd Edition, Englewood Cliffs,NJ, Prentice Hall, Inc., 1995, ISBN 0-13-216987-8.
3. A. S. Tanenbaum, *Computer Networks*, 2nd Edition Englewood Cliffs, NJ, Prentice-Hall, Inc., 1989, ISBN 0-13-162959-X.
4. J. L. Hammond and P. J. P. O'Reilly,*Performance Analysis of Local Computer Networks*, Reading, MA, Addison-Wesley Publishing Company, 1986, ISBN 0-201-11530-1.
5. B. Albert and A. P. Jayasumana, *FDDI and FDDI-II Architecture, Protocols, and Performance*, Boston, MA, Artech House, Inc., 1994, ISBN: 0-89006-633-7.
6. W. Stallings, *Local and Metropolitan Area Networks*, 4th Edition, New York, NY, Macmillan Publishing Co., 1993, ISBN: 0-02-415465-2.
7. W. Stallings, *Data and Computer Communications*, 3rd Edition, New York, NY, Macmillan Publishing Co., 1991, ISBN: 0-02-415454-7.
8. E. Nemeth, G. Snyder, S. Seebass, T. R. Hein,*Unix System Administration Handbook*, 2nd Edition, Englewood Cliffs, NJ, Prentice Hall PTR, 1995, ISBN: 0-13-151051-7.
9. L. Kleinrock, *Queueing Systems, Vol. I: Theory*, New York, NY, John Wiley Sons, Inc., 1975, ISBN 0-471-49110-1.
10. L. Kleinrock, *Queueing Systems, Vol. II: Computer Applications*, New York, NY, John Wiley Sons, Inc., 1976, ISBN 0-471-49111-X.
11. H. Kobayashi, *Modeling and Analysis: An Introduction to System Performance Evaluation Methodology*, Reading, MA, Addison-Wesley Publishing Co., 1978, ISBN 0-201-14457-3.
12. F. R. Steinberg and C. B. Silio, Jr., *Adaptation of FDDI Physical Layer Chip to PLAYTHROUGH Protocol*, IEEE Proceedings of the 11th Annual International Phoenix Conference on Computers and Communications, Phoenix, AZ, April, 1992, ISBN 0-7803-0606-6, pp. 620-627.
13. N. Lin and C. B. Silio, Jr., *A Reliability Comparison of Single and Double Rings*, IEEE Proceedings of INFOCOM '90, San Francisco, CA, June 1990, ISBN 0-8186-2049-8, vol. II, pp. 504-511.
14. J. Yin and C. B. Silio, Jr., *A Reliability Analysis of Failsoft FDDI Networks*, IEEE Proceedings of the 17th Conference on Local Computer Networks, Minneapolis, MN, Sept. 1992, ISBN 0-8186-3095-7, pp. 158-167.
15. J. Yin and C. B. Silio, Jr., *Reliability of FDDI's Dual Homing Network Architecture*, IEEE Proceedings INFOCOM'94, Toronto, Ontario, Canada, June, 1994, ISBN 0-8186-5570-4, vol. 3, pp. 1382-1389.
16. J. Yin and C. B. Silio, Jr., *K-Terminal Reliability in Ring Networks*, IEEE Transactions on Reliability, vol. 43, no. 3, Sept. 1994, pp. 389-401.

17. C. B. Silio, Jr., H. M. Ghafir, and M. R. Parikh. *An Approximate Method for the Performance Analysis of PLAYTHROUGH Rings*, IEEE Transactions on Computers, vol. 41, no. 9, Sept. 1992, pp. 1137-1155.

18. H. M. Ghafir and C. B. Silio, Jr., *Performance Analysis of a Multiple-Access Ring Network*, IEEE Transactions on Communications, vol. 41, no. 10, October, 1993, pp. 1494-1506.

19. L. B. Chai and C. B. Silio, Jr., *Voice Packet Transfer Time on an Integrated Services MARILAN*, Proceedings of the Twenty-ninth Annual Conference on Information Sciences and Systems, The Johns Hopkins University, Baltimore, MD, Mar. 1995, pp. 725-730.

20. P. C. Hershey, C. B. Silio, Jr., and J. G. Waclawsky, *Real Time Traffic Measurements for High-speed Networks*, BT Technology Journal, Vol. 13, No. 3, July, 1995, pp. 113-122.

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