Time:        Tu 6:30 – 9:20PM CDT
On-Campus:  Junkins Building 0101
Instructor:  Dr. Hakki Candan Cankaya
Office:      SIC 312
Phone:       469 467 6015
Email:       candan@lyle.smu.edu
Office Hours: M 9:20-10:00PM CDT & Tu 9:20-10:00PM CDT
             or by appointment

TEXT AND REFERENCE BOOKS:

Text Books:
1) **Computer Networks: A Systems Approach, 4th edition**
   by Larry L. Peterson, Bruce S. Davie
   Publisher: Elsevier/Morgan Kaufmann,
2) **MPLS: Next Steps**
   by Bruce S. Davie, Adrian Farrel
   Publisher: Morgan Kaufmann

Reference Books:
1) **Metro Ethernet**
   by Sam Halabi
   Publisher: Cisco Press
   ISBN: 158705096X
2) **Emerging Optical Network Technologies**
   by Krishna M. Sivalingham, Suresh Subramaniam
   Publisher: Springer

TENTATIVE GRADE DISTRIBUTION:

- **Homeworks** : 20%
  Homeworks are expected to be turned in on their due dates by 6:30pm without any delay.

- **Midterm Exam**: 25%
  There will be one midterm exam for the course. **Date is October 27**.

- **Term Paper** : 15% (with presentation)
  Each student will prepare a term paper and make an in-class presentation on the subject of the term paper. Students are strongly encouraged to come up with their own topics of interest for the term paper. An incomplete list of potential topics
may be provided and discussed by the instructor. Term paper proposals will be submitted on **September 15** by students and they become committed to the topic after the instructor’s approval. Instructor may choose to ask to modify the proposal or change to some other subject. All term papers and their presentation slide sets are due by **October 20, 6:30pm**.

- **Project: 15%**
  Students are encouraged to produce an implementation on their term paper topic and lead their efforts to a complete research paper that will be ready to submit to a conference and/or journal in the related research area. Students may choose to switch to another implementation, if necessary. Each student will prepare a demo for the project. A project report including design and implementation details, and demo instructions should be submitted by **November 24, 6:30pm**.

- **Final Exam : 25%**
  Final exam will be a comprehensive exam for the entire course and will take place on the announced official final exam day and time.

**POLICIES:**
- Handouts will be posted on the Blackboard tool. In case of access problems, please contact Ms. Debra McDowell (debrmcd@engr.smu.edu, 214-768-3080) to get copies of the handouts.
- Even though office hours are provided, the students may contact me via email or meet me by an appointment.
- Deadlines are hard deadlines. Delay may cause reduction in grading. Delays without notice may cause rejection of the submission.

**OBJECTIVE:**
The objective of this course is to introduce students to a set of advanced topics in networking and lead them to the understanding of the networking research with a target of accomplishing a research paper of their own.

**TENTATIVE TOPICS:**
- Introduction, overview of network building blocks
- Network architecture with layers and protocols
- Overview of data link concepts
- IP addressing, forwarding, and routing
- BGP and adaptive routing
- Multi-Protocol Label Switching (MPLS)
  - MPLS Architecture and related protocols
  - Traffic Engineering (TE) and TE with MPLS
- Transport protocols and congestion control
  - Quality of Service (QoS) with MPLS technology
  - Network recovery and restoration with MPLS technology
- Virtual Private Networks (L2, L3, and Hybrid)
• Metro Networks
  o Metro technologies
    ▪ Ethernet over SONET
    ▪ Resilient Packet Rings
    ▪ Ethernet transport
  o Metro Ethernet services
    ▪ L2 switching
  o L3/L2VPNs for Metro
    ▪ Pseudowire (PW) concept (multisegment/redundant PW’s)
    ▪ Ethernet over MPLS
    ▪ VPLS
• Optical Networks
  o WDM
    ▪ Wavelength routing
    ▪ LightPaths/Lighttrails
    ▪ Wavelength conversion and rerouting
    ▪ Network Survivability and Provisioning
    ▪ IP over DWDM
  o Next generation Optical Networks
    ▪ Optical Circuit Switching
    ▪ Optical Burst Switching
    ▪ Optical Packet Switching
• GMPLS (Generalized MPLS)
  o MPL (lambda) S
  o GMPLS architecture
• Other Hot Topics (Time permitting)
  o Sensor Networks
  o Mobile Internet
  o Home networking
  o TriplePlay/IPTV

INCOMPLETE LIST OF RELATED ORGANIZATIONS:
• ACM – SIGCOMM: Special Interest Group on Data Communications
  http://www.sigcomm.org/
• ACM – SIGMOBILE: Special Interest Group on Mobility of Systems, Users, Data, and Computing
  http://www.sigmobile.org/about/
• IEEE – Communications Society: Standards, Technical Committees on Networking, etc.
  http://www.comsoc.org/
• IEEE – Computer Society:
  http://www.computer.org/portal/site/ieeecs/index.jsp
• IETF: Internet Engineering Task Force
  http://www.ietf.org
  o Internet Drafts
• Internet RFCs
  • ITU: International Telecommunication Union
    http://www.itu.int/net/home/index.aspx
  • MEF: Metro Ethernet Forum
    http://www.metroethernetforum.org/
    o Working Group Documents

SIMULATION TOOLS:
• OPNET
  http://www.opnet.com/
• ns2 (network simulator)
  http://www.isi.edu/nsnam/ns/

OTHER REFERENCES:
• Computer Networks
  by A. S. Tanenbaum,
  Publisher: Prentice Hall;
• Emerging Optical Network Technologies
  by Krishna M. Sivalingham, Suresh Subramaniam
  Publisher: Springer ISBN: 0-387-22582-X
• Mesh Based Survivable Networks,
  by Wayne Grover,
  Publisher: Prentice Hall, ISBN: 013494576X

IMPORTANT INFORMATION:
Disability Accomodations: Students needing academic accommodations for a disability must first contact Ms. Rebecca Marin, Coordinator, Services for Students with Disabilities (214-768-4557) to verify the disability and establish eligibility for accommodations. They should then schedule an appointment with the professor to make appropriate arrangements. (See University Policy No. 2.4.)

Religious Observance: Religiously observant students wishing to be absent on holidays that require missing class should notify their professors in writing at the beginning of the semester, and should discuss with them, in advance, acceptable ways of making up any work missed because of the absence. (See University Policy No. 1.9.)

Excused Absences for University Extracurricular Activities: Students participating in an officially sanctioned, scheduled University extracurricular activity should be given the opportunity to make up class assignments or other graded assignments missed as a result of their participation. It is the responsibility of the student to make arrangements with the instructor prior to any missed scheduled examination or other missed assignment for making up the work. (University Undergraduate Catalogue).