

Fall 2009

# CEG 702-01: Advanced Computer Networks

Yong Pei

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**CEG 702 -01 ADVANCED COMPUTER NETWORKS**  
**4 Credits, Fall Quarter 2009**

**Syllabus**

**Time/Place:** Lecture: 4:10 – 5:25 PM, M/W, 150 Russ Engineering Center

**Instructor:** Dr. Yong Pei, 489 Joshi Research Center  
Tel. 937-775-5111, Email: yong.pei@wright.edu  
Office Hours: 3:00-4:00pm, M./W.

**Prerequisites:** CEG 602 and CEG 633 (or equivalent)

**Required Textbook:**

**“Internetworking with TCP/IP Vol. I: Principles, Protocols, and Architecture”**; 5th edition, Douglas Comer, Prentice Hall. ISBN #: 0131876716.

Please Note: Since this is an advanced graduate course, the textbook is only the starting point for selected topics that we will cover. The slides used will cover ideas from a broader range of sources, including other books, papers, RFCs etc. The WebCT class site will have online links to those resources.

**Supplemental Readings:**

- Lecture slides will be posted through WebCT.  
WebCT Guide: [http://wisdom.wright.edu/gettingstarted/03\\_logon.html](http://wisdom.wright.edu/gettingstarted/03_logon.html)

**Recommended Books:**

- **An Engineering Approach to Computer Networking**, Srinivasan Keshav, 1st Edition, Addison-Wesley Pub Co; ISBN: 0201634422.
- **TCP/IP Illustrated, Vol 1**; W.R. Stevens, Addison-Wesley professional computing series, ISBN: 0-201-63346-9.

**Website:** CEG 702 in WebCT.

**Catalog Description:**

This course provides an in-depth examination of the fundamental concepts and principles in communications and computer networks. Topics include: queuing analysis, ATM, frame relay, performance analysis of routings, and flow and congestion controls.

**Course Description:**

The Internet protocols have revolutionized communications. This advanced networking course will equip you with a deep knowledge of network concepts, protocol design, and performance analysis that make the Internet work, help you develop critical insight into their design, and obtain a first hand feel for implementation through homework and project exercises. Another key goal is to prepare you for doing research in the field of networking. Additional protocols from the OSI and telecommunications/ATM world will also be featured to provide in-depth comparative studies.

Specifically, we will start with a review of basic networking ideas and then review and study topics such as:

- Network layer addressing and forwarding (IP, IPv6),
- Intra-domain routing (RIP, OSPF),
- Inter-domain routing (BGP, EGP, Nimrod),
- Transport layer (TCP, UDP),
- Congestion control techniques (TCP, Frame-relay)
- IP multicast (IGMP, MBONE, Multicast Routing/Transport/Congestion Control),
- Network management, Auto-configuration (SNMP, DHCP, ICMP, ICMPv6),
- Queueing analysis, network performance evaluations
- IPv6 design, comparative critique, deployment issues, NAT
- QoS mechanisms, protocols and architectures (scheduling, shaping, RTP, Int-serv, Diff-serv, RTP, RSVP),
- Naming (DNS), Overlay & Peer-to-Peer Networks

Optional topics: (time permitting)

- Traffic engineering (IP-over-ATM, MPLS, OSPF-extensions, VPNs)
- Measuring and Instrumenting the Internet
- High-speed router design
- High-speed networks (Metro-area GbE, SONET, Optical Networks)

**Grading:**            Project – 25 %  
                             Homework – 10%  
                             Midterm Exam – 30%  
                             Final – 35%