CSC 435 – COMPUTER NETWORKING

CREDIT HOURS: 3
PREREQUISITES: CSC 302; CSC 323 or 333 or 341 or 342.
GRADE REMINDER: Must have a grade of C or better in each prerequisite course.

CATALOG DESCRIPTION

Computer communication and networking. Network organization and operation. Network architecture including hardware, software, protocols, and analysis. Example and proposed systems including LANs, WANs, and the Internet. Network applications and interfaces, security and integrity issues.

PURPOSE OF COURSE

Acquire communication concepts and vocabulary; explore protocol organization, analysis and examples; develop simple distributed programs; review some of the social and economic aspects of networking.

EDUCATIONAL OBJECTIVES

The goal of this course is to have students develop computer communications and networking skills. Success will be evaluated through the completion of laboratory and project assignments, performance on homework problems, and analysis of exam responses. Specific skills include:

1. Demonstrate knowledge of models, standards, and protocols for communication.

2. Develop skills in problem solving involving information (voice/video/data) transfer.

3. Apply queuing systems techniques to network design and performance.

4. Analyze protocol design, analysis, and examples in a layered framework.

5. Analyze data integrity and network security.

6. Recognize communications concepts and vocabulary.

7. Develop simple distributed computing programs.

8. Generalize Internet networking and application development skills.

COURSE CALENDAR

This course meets for a minimum of 37.5 lecture contact hours during the semester, including the final exam. Students have significant weekly extracurricular assignments which involve readings, programming, conceptual questions, or engaging in other forms of preparation. Students are expected to complete 4-5 major homework assignments related to the above topics as well as multiple in-class laboratory assignments involving programming, analyzing packet captures in Wireshark, and 2-3 periodic exams in addition to the final exam. Students are expected to prepare for any class assignments or quizzes over the material covered in class or the extracurricular activities. Successful completion of these activities requires at a minimum six additional hours of outside of classroom work each week.

CONTENT **Hours**

Overview of Teleprocessing and Data Communications.....3
- Objectives, Principles, Models, Standards

Transmission Fundamentals.....3
- Media, Services, Devices, Codes
- Analog and Digital Signals
- Modulation and Modems

Data Communication 5
- Transmission modes
- Interface Standards
- Multiplexing
- Contention Protocols

Data Security and Integrity 7
- Overview and Standards
- Parity, CRC, Hamming Codes
- Encryption and Decryption, Private and Public Key
- Data Integrity, Authentication, Signatures
- Viruses, Worms, Hacking

Protocols 8
- Overview and Simple Protocol
- Flow Control
- Sliding Window Protocols
- Protocol Correctness
- Example Data Link Protocols

Local Area Networks 8
- Topologies
- IEEE Standards (802.3, 802.4, 802.5, 802.11)
- Interconnecting LANs, DNS

Wide Area Networks 5
- Routing and Network Protocols
- Transport Protocols
- Example Protocols: ATM, Wireless

Network Applications 3
- TCP/IP Applications
- BISDN/ATM

Exams (plus final) 3

TOTAL 45

REFERENCES

Aboelela, E., Network Simulation Experiments Manual, 2nd. Ed., (for Peterson, L. and Davie, B., Computer Networks: A Systems Approach, (4th. Ed.) MK, 2007), MK, 2008.

FitzGerald, J., and Dennis, A., Business Data Communications and Networking, 10th. Ed, Wiley, 2009.

Kurose and Rose, Computer Networking: A Top-Down Approach, 6th Ed., Pearson, 2012.

Peterson, L. and Davie, B., Computer Networks: A Systems Approach, (4th. Ed.) MK, 2007.

Stallings, W., Data and Computer Communications, 10th Ed., Prentice Hall, 2013.

Tanenbaum and Wetherall, Computer Networks, 5th Ed., Pearson, 2010