CSCI 5363 - COMPUTER NETWORKS AND DISTRIBUTED SYSTEMS

CREDIT HOURS: 3
PREREQUISITES: CSCI 3342 and 6 advanced hours of CSCI (CSCI 4335 or 5360 recommended)
GRADE REMINDER: Must have a grade of C or better in each prerequisite course.

CATALOG DESCRIPTION

Communication models and protocols. Distributed algorithms and analysis. Distributed systems architectures and communications. Latest developments in communication technology including hardware, software, and applications.

PURPOSE OF COURSE

To provide the student with a knowledge of state-of-the-art communications technology, functionality, and distributed systems applications.

EDUCATIONAL OBJECTIVES

The goal of this course is to have students develop the concepts and skills necessary for the design and implementation of distributed systems. Evaluation of student progress will be measured through the successful completion of progressively more advanced laboratory assignments, performance on homework problems, and analysis of exam responses.

Upon successful completion of the course, students should be able to:

1. Demonstrate knowledge of communication terms and concepts.
2. Demonstrate skills in problem analysis and solution design for network problems including, centralized control networks, routing, and distributed control networks.
3. Develop classification measures and categorize distributed systems.
4. Identify distributed algorithm design problems in mutual exclusion, election, deadlock, termination, consensus and their respective solutions.
5. Apply distributed algorithm techniques to the analysis of distributed systems.
6. Develop and implement simple distributed applications that illustrate conceptual issues.
7. Utilize advanced language and library support features.

COURSE CALENDAR

This course meets for a minimum of 37.5 lecture contact hours during the semester. Students have significant assignments based on readings from the primary literature, participate in classroom discussions regarding current research topics, complete periodic homework and laboratory/programming assignments, and 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 in the reading material. Successful completion of these activities requires at a minimum six additional hours of outside of classroom work each week.

CONTENT **Hours**

Network Design 18
- Review analysis techniques - queuing systems, graph algorithms, optimization
- Network designs, standards, and interfaces
- Protocol design and performance analysis

Distributed Algorithms 12
- Processes, communication, classification
- Issues - mutual exclusion, election, deadlock, termination, data transfer, consistency, consensus

Distributed Systems 12
- Architectural models, design goals, services
- Protocols and technologies
- Characteristics, interface, software
- File and directory structures, sharing, recovery, concurrency
- Security (access, authentication, encryption)
- Representative systems

Exams (plus final) 3

TOTAL 45

REFERENCES

Barbosa, V., An Introduction to Distributed Algorithms, MIT Press, 1996.

Bertsekas, D., and Gallager R., Data Networks, 2nd Ed., Prentice Hall, 1992.

Coulouris, G. F., Dollimore, J., and Kindberg, T., Distributed Systems, 4th Ed., Addison-Wesley, 2005.

Kershenbaum, A., Telecommunication Network Design Algorithms, McGraw-Hill, 1993.

Kshemkalyani, A., Singhal, M., Distributed Computing: Principles, Algorithms, and Systems, Cambridge, 2008.

Lynch, N., Distributed Algorithms, Morgan Kaufmann, 1996.

Raynal, M., Distributed Algorithms and Protocols, John Wiley, 1988.

Schwartz, M., Telecommunication Networks Protocols, Modeling and Analysis, Addison-Wesley, 1987.

Tanenbaum, A.S., Computer Networks, 5th Ed., Prentice Hall, 2010.