CATALOG DESCRIPTION: Distribution of data, computation, and control in distributed processing systems will be discussed. This course will cover study of a distributed programming language such as Ada. Selected topics include networking, internetworking, data communication principles, inter-process communication in UNIX, distributed coordination, distributed databases, distributed deadlock detection, recovery, fault tolerance, and security issues.

PREREQUISITE: CMPS 500, or permission of the instructor.

CLASS SCHEDULE: 2:00 – 3:20 TR

CLASS LOCATION: 132W, Thurman Hall

OFFICE HOURS: 11:00 – 2:00 MTWR, or by appointment

OFFICE: N101, Thurman Hall

OFFICE PHONE: 225-771-4385

EMAIL ADDRESS: sudhir_trivedi@subr.edu

INSTRUCTOR: Sudhir K. Trivedi, Ph.D. Computer Science, Ph.D. Mathematics, Professor and Chair, Computer Science Department

TEXTBOOK: Jie Wu, Distributed System Design, CRC Press, 2000 (ISBN 0-8493-3178-1).

REFERENCES:

1. George Coulouris, Jean Dollimore, and Tim Kindberg. Distributed Systems: Concepts and Design, 5th Edition, Addison and Wesley Publishing Company, 2012.
2. Narain Gehani and Andrew McGettrick, Concurrent Programming, Addison and Wesley Publishing Company, 1988.
3. Abraham Silberschatz, Peter Baer Galvin, and Greg Gagne, Operating Systems Concepts, Addison and Wesley Publishing Company, 2003.
4. Imad Abbadi, Cloud Management and Security, John Wiley and Sons Ltd., 2014.
5. Thomas Limoncelli, Strata Chalup, and Christina Hogan, The Practice of Cloud System Administration – Designing and Operating Large Distributed Systems, Volume 2, Addison-Wesley, 2014.

GOALS: Distributed systems are becoming increasingly versatile because of their ability to provide resource and data sharing as well as computational speed up. The purpose of this

class is to familiarize the students with advancements in the distributed processes, distributed coordination, distributed deadlocks, and distributed databases, and to gear the students toward using a research oriented approach.

TOPICS: Topics to be covered include:

1. Distributed computing as forerunner for cloud computing; distribution of data, computation, and control in distributed systems; potential for distributed processing systems; centralized versus fully distributed systems; synchronous and asynchronous communication; shared memory versus message passing models.
2. Applications and standards of distributed systems; distributed programming; formal approaches to distributed systems design; happened before relation; consistent global state; distributed coordination; event ordering in a fully distributed environment; algorithms for distributed mutual exclusion; equal effort/responsibility rule; election algorithms; complexity of distributed algorithms.
3. Prevention, avoidance, and detection of deadlocks in distributed systems; disaster recovery and security issues in distributed systems; checkpoint algorithms.
4. Distributed routing algorithms; adaptive, deadlock-free, and fault tolerant routing; reliability in distributed systems; static and dynamic load balancing.
5. Distributed data management; serialization theory; concurrency control; partitioning, replication and consistency management; voting protocols; distributed reliability protocols; distributed system applications.
6. Inter-process communication in UNIX; shared memory and socket based inter-process communication.
7. Cloud definitions, services, and deployment; cloud architecture; cloud properties such as adaptability, availability, reliability, resilience, scalability, and security; cloud management platforms and services; cloud security challenges; risks associated with different clouds deployment models and services and mitigation of such risks.
8. Importance and challenges of establishing trust in the cloud; cloud provenance and its importance for establishing cloud trustworthiness; big data and clouds; future of cloud computing and road map for establishing the next generation clouds.

COURSE REQUIREMENTS: Students are expected to know the code of student conduct and are responsible for their own work. Plagiarism will not be tolerated. Students must take exams and finish their homework and assignments in time. There may be unannounced quizzes in the beginning of some classes. So, be in time and try not to miss classes. Late assignments may be considered with due penalties. Attendance is strongly encouraged. However, merely attending classes does not guarantee a passing grade.

EVALUATION AND GRADING: Standard grading scale will be followed. Curve, if any, will be at the end of the semester and will be intended to benefit those students who have made sincere efforts to improve their performance in the class. A student may be assigned a lesser than computed grade if he/she is absent from too many classes. Makeup exams will be given only after the establishment of a legitimate excuse, else the students will be

treated as having received a zero. The following is the distribution of various components of the course:

Midterm	25%
Final	25%
Term paper and presentation	25%
Programs/homework/quizzes/class participation	25%

PROCEDURES/SPECIFICATIONS FOR THE TERM PAPER

1. Write your own English; ABSOLUTELY no cut and paste.
2. Spell check extensively. Make sure your grammar is correct.
3. Double space with a size 12 and Times New Roman font, one and a half-inch margin on the left, and one-inch margin on all other sides.
4. Prepare 8-12 pages, 8-12 PowerPoint slides; plan to complete your presentation in 15 to 20 minutes.
5. If you are reproducing a line or paragraph from somewhere, it must be placed in quotes and properly referenced. All citations should be properly referenced. Failing to do so may be construed as plagiarism.