COSC - Computer Science | Grad

COSC 5000 Distributed Systems (3)

Students will examine the fundamentals of computer information systems in a distributed environment, including network concepts, operating systems concepts, network operating systems, transaction management and time coordination. Emphasis will be placed on the elements necessary for distributed information systems.

COSC 5010 Software Engineering I (3)

In this course, students will learn the foundational principles of object-oriented analysis and design, focusing on key concepts such as classes, polymorphism, encapsulation, and inheritance. Emphasis will be placed on applying these principles to the development of medium to large-scale software systems, as well as distributed systems. Through hands-on projects, students will design and implement a logical software system, gaining practical experience in software development and engineering best practices. **Prerequisite**: Programming proficiency in C++.

COSC 5020 Software Engineering II (3)

In this course, students will build upon the principles of software engineering and object-oriented programming learned in previous courses (COSC 5010). They will apply these principles to the implementation of a comprehensive information system project using C++. Emphasis will be placed on advanced topics such as design patterns, software architecture, testing methodologies, and project management. Students will collaborate in teams to translate their object-oriented design concepts from prior coursework into a functional, maintainable, and scalable software solution. **Prerequisite**: COSC 5010.

COSC 5030 Agile Software Development (3)

Students will explore the important principles of software development: delivering value to the customer, focusing on individual developers and their skills, collaboration, an emphasis on producing working software, the critical contribution of technical excellence and a willingness to change course when demands shift. Several key software development methods are investigated and one methodology is actively examined using a course development project. **Prerequisite**: COSC 5020.

COSC 5040 Distributed Database Design (3)

Students will study the principles of homogeneous database technology and the principles of distributed database systems. The emphasis will be on the integration of heterogeneous database management systems into a coherent system. Students will develop a logical design for a distributed database.

COSC 5050 Distributed Database Applications (3)

Students will implement the distributed database developed in COSC 5040. Emphasis will be on good design techniques and proper documentation. Students will implement a database project in this course. **Prerequisite**: COSC 5040.

COSC 5060 Systems Concepts (3)

Students will study the mathematical basis of connected systems. Topics will include queues, graphs, matrices and finite state machines. **Prerequisite**: College algebra.

COSC 5070 Advanced Computer Algorithms (3)

This course focuses on designing efficient algorithms to solve various problems, the students will learn the mathematical proofs of correctness and analyze the time and space complexity. The topics will cover lower bounds for sorting, amortized analysis of advanced data structures, graph algorithms (such as shortest paths, network flow, and bipartite matching), and an introduction to NP-completeness.

COSC 5080 Advanced Operating Systems (3)

This course will explore advanced concepts in operating system design, covering topics such as interprocess communication, distributed processing, replication and consistency, fault tolerance, synchronization, and file system architecture. Understanding and mastering the distributed operating system.

COSC 5110 Network Architecture (3)

Students will study the fundamental concepts of computer networks. Topics will include network topologies, protocols and network operating systems. The OSI model will be used to evaluate and compare systems.

COSC 5120 Data Communication (3)

Students will study the internet working standards and common carrier services. Emphasis will be placed on the analysis and design of systems using current communication technologies.

COSC 5130 Computer Security and Reliability (3)

Students will study hardware and software reliability and security using currently available technology. Emphasis will be placed on security analysis of the system, physical threats to systems, virus protection, system recovery and encryption.

COSC 5140 Network Design and Management (3)

Students will study the design of a distributed system. The emphasis will be on systems with multiple topologies and protocols.

COSC 5150 Distributed Application Development (3)

Students will be introduced to the creation of Web-based applications. This course will also cover the components of Web design and incorporate various languages to enhance Web documents. **Prerequisite**: COSC 5050.

COSC 5160 Parallel and Distributed Computing (3)

Explore models of parallel computation with a focus on designing efficient software systems. Learn fundamental concepts for representing parallel computation structures and how to apply these in software design. Study representative parallel programming frameworks and develop software solutions using parallel algorithms and computation techniques. Gain hands-on experience in building scalable, high-performance applications that leverage modern parallel programming systems. **Prerequisite**: COSC 5070

COSC 5200 Issues in Distributed Systems (3)

Students will be introduced to the issues in emerging technologies in distributed systems. This course will cover advanced theories and technologies in building distributed systems, such as mobile applications and web services.

COSC 6000 Distributed Systems Project (3)

Students will design and implement a major system distributed information system that integrates the learning experiences gained in the previous courses. **Prerequisites**: COSC 5150 and completion of 30 credit hours of the required and elective COSC courses in this program.