

**COSC 5325: Workshop in Computer Science**

Designed to provide instruction for groups who wish to study current specific areas in computer science. This course may be repeated once for credit when content changes. MAY NOT BE USED FOR THE MS IN COSC DEGREE.

**COSC 5326: UNIX Programming Environment**

This course will cover shell programming, filters, I/O programming, program development, and document preparation. Special attention will be given to UNIX systems programming. Offered in spring of odd years and summer of even years.

**Prerequisites:** COSC 2315, COSC 2336.

**COSC 5330: Operating Systems**

Analysis of operating systems software for computing systems, and resource management procedures and techniques used in all types of computing environments. Topics include processes, synchronization, scheduling algorithms, memory management, security, device management, deadlocks, and file systems. Offered every fall.

**Prerequisites:** COSC 2315, COSC 2336.

**COSC 5336: Local Area Networks**

LAN architectures and media. In addition, course will cover inter-networking, performance, and design issues. Special attention will be paid to IEEE 802 and all current systems.

**Prerequisites:** COSC 2315, COSC 2336.

**COSC 5340: Programming Languages**

Theoretical aspects of programming languages, design and implementation criteria, analysis and classification of programming languages. Topics include: language design principles; translation and the formalization of syntax; generalization of primitive and abstract data types; sequence, data, and subprogram control; and language paradigms such as imperative, object-oriented, functional, logic, concurrent, and visual. Offered every fall.

**Prerequisites:** COSC 2315, COSC 2336.

**COSC 5345: Computer Graphics**

An introduction to computer graphics stressing interactive graphics. Basic theory and applications will be covered. GKS graphics and an introduction to 3-D graphics will be given. Offered in summer of odd years.

**Prerequisites:** COSC 2315, COSC 2336.

**COSC 5346: Expert Systems**

Basic concepts for building expert systems, architecture of expert systems, the knowledge acquisition process, languages and tools for building expert systems, evaluation of expert systems, issues and case studies, and practices in the design and evaluation of expert systems. Offered in fall of odd years.

**Prerequisites:** COSC 2315, COSC 2336.

**COSC 5350: Data Communication and Networks**

An introduction to data communications and networking. Covers the architecture, design and implementation of computer networks. Topics include data transmission, switching, protocols and security. Offered every spring.

**Prerequisites:** COSC 2315, COSC 2336.

**COSC 5351: Computer-Human Communications**

Study of computer interfaces with a special emphasis on highly interactive interfaces. A complete study of the X Windows Architecture including hardware, communication protocols, and programming.

**Prerequisites:** COSC 2315, COSC 2336.

**COSC 5352: Client/Server Architectures**

Design and implementation of client/server systems. Topics include: network protocols, OLE DGE, CORBA, server design and implementation and tightly integrated message systems. Offered in summer of odd years.

**Prerequisites:** COSC 2315, COSC 2336.

**COSC 5354: Parallel and Supercomputing**

Methods for creating and implementing parallel algorithms. Parallel programming, programming models, and architectures of vectorized supercomputers, shared memory, and distributed architectures.

**Prerequisites:** COSC 2315, COSC 2336.

**COSC 5360: Database Design**

An introduction to database systems and design. Covers relational, hierarchical, and logical database models. Topics include database modeling, design, security, management, implementation and integration. Offered every spring.

**Prerequisites:** COSC 2315, COSC 2336.

**COSC 5361: Digital Image Processing**

Basic concepts in Digital Image Processing. Topics include two-dimensional transforms, filtering, enhancement, restoration, edge detection, segmentation, texture, matching, image representation, feature detection, and their application. Offered in fall of odd years.

**Prerequisites:** COSC 2315, COSC 2336.

**COSC 5362: Pattern Recognition**

Various stages in a recognition system and their design will be discussed. Topics include: preprocessing, feature extraction, recognition, knowledge base, and associative storage. Algorithms and implementation of these stages will be discussed. Practical applications such as character recognition, satellite image analysis, MRI data analysis, and other biomedical applications will be discussed. Offered in spring of even years.

**Prerequisites:** COSC 2315, COSC 2336.

**COSC 5365: Artificial Intelligence**

Introduction to the basic concepts of artificial intelligence. Topics covered will include knowledge representation, A.I. programming, learning, and neural nets. Offered in spring of even years.

**Prerequisites:** COSC 2315, COSC 2336.

**COSC 5370: Software Engineering**

Program development techniques with structured methodologies. Top-down development, modeling tools, structured programming, programming style, program testing and debugging. Offered in fall of even years.

**Prerequisites:** COSC 2315, COSC 2336.

**COSC 5371: Data Mining**

Study of the concepts and techniques of data mining, or knowledge discovery in databases. The automated or convenient extraction of patterns representing knowledge implicitly stored in large databases, data warehouses, and other massive information repositories. Offered in fall of even years.

**Prerequisite:** COSC 5360.

**COSC 5374: Software Architecture**

Concepts and methodologies for the systematic analysis, development, evolution, and reuse of software architectures. Understanding the elements of software architectures including components, connectors, styles, patterns, and constraints. Developing software architectures from functional requirements. Evaluation and selection of alternative software architectures based on non-functional requirements. State of the practice and art. Offered in spring of odd years.

**Prerequisite:** COSC 2336 or equivalent.

**COSC 5375: Advanced Database Design**

Database design issues including: query processing, interpretation, optimization, and methods for implementing and optimizing logic queries. Knowledge databases, distributed databases, and object-oriented databases. Offered in spring of odd years.

**Prerequisites:** COSC 5360.

**COSC 5376: Fundamentals of Data Warehouses**

This course provides an overview of the fundamentals of data warehousing including the planning, designing, building, populating, and maintaining a successful data warehouse. Specific topics covered include the logical design of a data warehouse, data warehousing architecture, extract-transform-load processing, a comparison of OLAP and OLTP and query processing utilizing multidimensional views of data. Offered in summer of even years.

**Prerequisite:** COSC 5360.

**COSC 5377: Fundamentals of Modeling and Distributed Simulation of Complex Systems**

This course aims to teach the fundamentals of modeling, simulation, distributed

simulation, and large-scale asynchronous distributed simulation of real systems on parallel processors. Examples from the real world include CAD of digital systems, IVHS transportation, military command and control, medical networks, banking networks, and asynchronous transfer mode (ATM) networks. Offered in fall of even years.

**Prerequisites:** COSC 2315, COSC 2336.

### **COSC 5378: Applied Computer Graphics**

This graduate level course will begin with the basic theory of computational graphics, describe important applications, especially in the fields of medicine and GIS, and require students to complete a substantial applied project utilizing graphical tools and packages that are widely used in industry and computer graphics community. The basic theory will build on mathematical foundation and focus on geometric primitives, color models, coordinate systems, transformation of object views in 2D and 3D, projection, illumination, reflection, shading, and ray tracing.

**Prerequisites:** COSC 2315, COSC 2336.

### **COSC 5379: Advances in Remote Sensing and GIS Analysis**

This course will bring together recent developments in remote sensing and GIS analysis with a particular emphasis on software development techniques. Topics will include GIS data models, software algorithms for data storage, and analysis.

**Prerequisites:** COSC 2315, COSC 2336.

### **COSC 5380: Research Project**

Faculty directed independent study of a computer science problem, subject, or research topic relevant to the student's current or anticipated career field. A professional quality computer science project report and an oral presentation of the research project are required. A student may not begin work on the project before completing the graduate core. After starting the project, students must register for at least three credit hours of the COSC 5380 each semester until the project is completed and approved. Offered every fall, spring and summer.

**CR/NC Only. Prerequisites** or Currently Enrolled in: COSC 5330, 5340, 5350, and 5360.

### **COSC 5381: Advanced UNIX O/S Design**

This advanced graduate course aims to expose students to practical challenges in operating systems design today, especially securing it from threats from viruses and worms, and intelligent attacks. The course will combine lectures with a significant project and feature extensive analysis of case studies.

**Prerequisites:** COSC 5330 and (COSC 5326 or instructor permission).

### **COSC 5382: Comprehensive Internet Security**

This course will introduce the student to the topics of computer security, network security, and Web security, in a coherent manner. It will give detailed coverage of the theory, deployment and management of high security Web applications. Considerable attention will be paid to methods of Web site authentication, authorization, privacy and

confidentiality. As a part of the course, students will build a highly secure Web site project.

**Prerequisites:** COSC 2315, COSC 2336.

**COSC 5390: Topics in Computer Science**

This course can be taken up to two times for credit when content changes. Offered every fall, spring and summer.

**Prerequisites:** COSC 2315, COSC 2336.

**COSC 5391: Topics in Distributed Systems**

Selected topics in distributed systems, computer networks, and distributed databases. Design of local area networks and multiple network systems, database programming languages, and operating systems for distributed systems.

**Prerequisite:** COSC 5350.

**COSC 5395: Thesis**

Selection of a research topic and development of a thesis plan. Offered every fall, spring and summer.

**CR/NC Only. Prerequisites** or currently enrolled in: COSC 5330, 5340, 5350, and 5360.

**COSC 5396: Thesis**

Completion and approval of thesis.

**Prerequisite:** COSC 5395 or concurrent enrollment. Offered every fall, spring and summer. **CR/NC Only.**

**COSC 5199-5399: Independent Study**

Independent study in specific areas of computer science not covered by organized graduate courses. A maximum of 6 credit hours of independent study courses may be applied toward a graduate degree. Offered every fall, spring and summer.

**Prerequisite:** Consent of department chair.