

**Department of Computer and Information Science**  
**Descriptions of Elective and Graduate Courses for Fall 2009**  
**Updated 11 May 2009**

**Undergraduate Elective Offerings**

\* denotes special topics offering

CSci 323-01: Systems of Programming, Dr. Tobin Maginnis

CSci 475-01: Introduction to Database Systems, Dr. Stephen Rice

CSci 531-01: Artificial Intelligence, Dr. Dawn Wilkins

CSci 561-01: Computer Networks, Dr. Paul Ruth

CSci 581-01: \*Scientific Visualization, Dr. Phillip Rhodes

Engr 596-63: \*Computer Audio, Dr. Stephen Rice

**Graduate-level Offerings**

\* denotes special topics offering

CSci 531-01: Artificial Intelligence, Dr. Dawn Wilkins

CSci 561-01: Computer Networks, Dr. Paul Ruth

CSci 581-01: \*Scientific Visualization, Dr. Phillip Rhodes

Engr 664-01: Theory of Concurrent Programming, Dr. Conrad Cunningham

Engr 691-63: \*Computer Audio, Dr. Stephen Rice

Engr 692-66: \*Randomized Algorithms, Dr. Yixin Chen

## **CSci 323-01: Systems of Programming**

Instructor: P. Tobin Maginnis, Ph.D (ptm@pix.cs.olemiss.edu),  
Associate Professor, Computer and Information Science

Time/Room: 10:00 MWF, Weir 106

Prerequisites: CSci 112

Textbook: TBD

### **Description:**

Study of a contemporary operating system and its set of tools from the perspective of software professionals and system administrators. The course analyzes the system components and their interactions, the tool environment, and system administration issues such as configuration, installation, networking, security, and performance tuning.

Upon successful completion of this course, the students are able to:

1. describe and use a core set of Unix/Linux commands;
2. install and configure at least two Linux distribution desktop or server implementations;
3. perform routine Unix/Linux system administration.

## **CSci 475-01: Introduction to Database Systems,**

Instructor: Instructor: Stephen Rice, Ph.D. (rice@cs.olemiss.edu)  
Assistant Professor, Computer and Information Science

Time/Room: 2:00 p.m. MWF, Weir 235

Prerequisite: CSci 211 and 223

Textbook: Tahaghoghi, Williams, *Principles Learning My SQL*, O'Reilly Media Inc., 2007. ISBN: 0-596-00864-3;  
Watson, *Data Management: Databases and Organizations*, Fifth Edition, John Wiley & Sons Inc., 2006, ISBN: 0-471-71536-0

### Description:

A database is an organized electronic storehouse of data. Many computer applications require the use of a database. A database management system (DBMS) is the "keeper" of the database, facilitating the creation and maintenance of the database and providing fast and secure access to the data in the database.

In this course, we will examine the features of database management systems; we will learn to design databases that are well organized and efficient; and we will develop computer programs that access databases. We will cover the relational model and the entity-relationship model; the SQL database language; normalization, keys, and integrity constraints; database transactions and concurrency.

Students will receive hands-on experience in designing databases and implementing them using the MySQL database management system, and students will develop Java and PHP programs for interacting with MySQL databases.

## **CSci 531: Artificial Intelligence**

Instructor: Dawn Wilkins, Ph.D. (dwilkins@cs.olemiss.edu)  
Associate Professor, Computer and Information Science

Time/Room: 1:00 p.m. TuTh, Weir 235

Prerequisites: CSci 433 or CSci 502 or full graduate standing in computer science

Textbook: Russell, Norvig, *Artificial Intelligence: A Modern Approach*, 2<sup>nd</sup> Edition, Prentice Hall,  
ISBN: 9780137903955

### Description:

Use of the computer in human problem solving. Game theory, decision trees, Markov decision problems, selected topics.

## **CSci 561-01: Computer Networks**

Instructor: Paul M. Ruth, Ph.D. (ruth@cs.olemiss.edu)  
Assistant Professor, Computer and Information Science

Time/Room: 1:00 p.m. MWF, Weir 106

Prerequisites: CSci 423 or CSci 501 or full graduate standing in computer science

Textbook: TBD

### **Description:**

Analysis of loosely coupled computer communication, communication protocols, and network services; an open systems interconnection model is presented and compared to selected examples of computer networks. Prerequisite for this course may also be satisfied by equivalent coursework as approved by the department.

Upon successful completion of this course, the students can:

1. describe the role of networking, transport, and application layers in computer networking;
2. describe the basic transport layer services and how they are invoked by an application;
3. contrast socket services *versus* transport layer services;
4. contrast TCP, UDP, and SCTP transport services, matching application program requirements with each transport service;
5. describe the design trade-offs of 3-way and 4-way handshakes, open and closed mechanisms, and error control;
6. describe the role of, and give examples of, socket options;
7. contrast concurrent and iterative server design trade-offs

## **CSci 581-01: Special Topics in Computer Science I (Scientific Visualization)**

Instructor: Phillip Rhodes, Ph.D. (rhodes@cs.olemiss.edu)  
Assistant Professor, Computer and Information Science

Time/Room: 4:00 p.m. TuTh, Weir 106

Prerequisites: CSci 211 and 223 or full graduate standing in computer science

Textbook: TBD

### **Description:**

Scientific data comes from a variety of sources. Satellites produce terabytes of geospatial data each day, while mechanical and aerospace engineers run simulations of ignition data and fluid flow over a surface to create more efficient engines and airplane wings. Doctors use CT and MRI data to diagnose patients and find tumors. In all of these cases, producing an effective visual representation of the raw data is an important and necessary part of the process of understanding the significance of a dataset. However, increasingly large dataset size and complexity presents a growing bottleneck for the visualization of scientific data.

This course is an overview of issues relating to representation, handling, and visualization of scientific data. Topics include 2D and 3D visualization techniques, data formats for representation of regular and unstructured scientific data, and multidimensional access methods.

## **Engr 664-01: Theory of Concurrent Programming**

Instructor: H. Conrad Cunningham, D.Sc. (cunningham@cs.olemiss.edu)  
Professor and Chair, Computer and Information Science

Time/Room: 8:00 TuTh, Weir 235

Prerequisite: None

Textbook: Magee, Kramer, *Concurrency: State Models and Java Programs*, 2<sup>nd</sup> Edition, Wiley, ISBN: 978-0470093559

Description:

Topics in the theory of concurrent programming. Models of concurrency. Programming logics. Emphasis on the formal specification and verification of concurrent programs. Case studies drawn from several areas of computer science.

The goals of this course are to:

- Present systematically the concepts and issues in concurrent programming
- Introduce rigorous techniques for the specification and analysis of concurrent program behaviors
- Give students experience in implementation of concurrent programs

**Engr 691-63: Special Topics in Engineering Science I (Computer Audio)**  
**Engr 596-63: Special Topics in Engineering Science I (Computer Audio)**

Instructor: Stephen Rice, PhD (rice@cs.olemiss.edu)  
Assistant Professor, Computer and Information Science

Time/Room: 4:00 p.m. MW, Weir 106

Prerequisite: CSci 211 and CSci 223

Textbook: None

Description:

This course introduces the student to the field of computer audio from a computer science perspective. Students gain an understanding of sound, speech, and music and their digital representation and processing in computer software. Programming assignments provide hands-on experience in playing, recording, mixing, synthesizing, and analyzing audio. Class lectures present algorithms and techniques for compression, watermarking, synthesis, sonification, pitch and beat detection, audio fingerprinting, speech and speaker recognition, and audio retrieval. An article describing the course is available online at <http://www.cs.olemiss.edu/~rice/SurveyCourse.pdf>.

## **Engr 692-66: Special Topics in Engineering Science II (Randomized Algorithms)**

Instructor: Yixin Chen, Ph.D (ychen@cs.olemiss.edu)  
Assistant Professor, Computer and Information Science

Time/Room: 2:30 p.m. TuTh, Weir 106

Prerequisite: Graduate standing with an appropriate background in data structure and algorithms. No background in probability theory and statistics is assumed.

Textbook: Mitzenmacher, Upfal, *Probability and Computing: Randomized Algorithms and Probabilistic Analysis*, 2005, Cambridge University Press, ISBN: 978-0521835404

### Description:

This course seeks to introduce to the students the basic theory, concepts, and techniques of randomized algorithms and give them a glimpse in the state-of-the-art of the area. The students will attain knowledge and skill of applying the probabilistic techniques discussed in the class to real world problems.

Upon successful completion of this course, the students should:

- understand the intuition behind and concept of randomized algorithms
- be able to analyze a class of randomized algorithms
- be able to apply the concept of randomized algorithms to real world applications

Topics to be covered will include basic probabilistic techniques such as random sampling, expectations, Markov's inequality, Chebyshev's inequality, Chernoff bounds, balls-and-bins models, and Markov chains, as well as applications such as a randomized Min-Cut algorithm, an analysis of Quicksort, a randomized algorithm for computing the median, random graphs, Theorem of Johnson and Lindenstrauss and random projection methods, and a randomized algorithm for nearest neighbor search.