

## Spring 2022 BSCS Undergraduate Electives

\*Schedule and course listings subject to change\*

- **CSCI 3515 Internet of Things: Sensing, Communication & Control**, He
  - Pre-requisites: CSCI 2312 & 2421
- **CSCI 3800-001 Network Programming**, Ogle
  - Pre-requisite: CSCI 3761
- **CSCI 3800-002 Unix Systems Programming**, Nam
  - Pre-requisite: CSCI 2421
- **CSCI 3916 Web API**, McCarthy
  - Pre-requisite: CSI 2421
- **CSCI 4408 Applied Graph Theory**, Gethner
  - Pre-requisite: CSCI 2511 or MATH 3000
- **CSCI 3800-H01 Database Systems Applications, Tools & Techniques**, Pastorino
  - Pre-requisite: CSCI 3287
- **CSCI 4211 Mobile Computing and Programming**, Lakhani
  - Pre-requisites: CSCI 3453
- **CSCI 4773 Introduction to Emerging System Security**, Li
  - Pre-requisites: CSCI 3761 & 3453
- **CSCI 4800-001 Advanced Mobile and Ubiquitous Systems**, Li
  - Pre-requisites: CSCI 3761 & 3453
- **CSCI 4800-002 Computational Motor Control**, Al Borno
  - Pre-requisites: CSCI 3412 & familiarity with linear algebra and probability

## Spring 2022 BSCS Breadth Courses

Additional courses beyond breadth area requirements will count toward as CS electives.

**Secure Computing:** **CSCI 4741, Principles of Cybersecurity**, Jafarian

Pre-requisite: CSCI 3287 & 3761

Required for the Cybersecurity and Secure Computing (CSSC) Certificate

**Data Science:** **CSCI 4580, Data Science**, Banaei-Kashani

Pre-requisites: CSCI 3287, CSCI 3412 & MATH 3195

**Scientific Computing:** **CSCI 4110 Applied Number Theory**, Gethner

Pre-requisite: CSCI 2511 or MATH 3000

**CSCI 4650, Numerical Analysis**, Math Dept

Pre-requisites: MATH 2411 & 3195

**System Software:** **CSCI 4287, Embedded Systems Programming**, Lakhani

Pre-requisite: CSCI 3453

**CSCI 4565, Introduction to Computer Graphics**, Choi

Pre-requisites: CSCI 3412 & MATH 3195 or 3191

## **Spring 2022 Special Topics Course Descriptions**

### **CSCI 3800-001 Network Programming, Ogle**

Students get an introduction to networking in CSCI 3761 and they get to write a couple of simple socket applications. But in those cases, they control both the client and the server portion of the project AND they get to define the protocols. In this course, we will explore how to create network applications. Over the course of the semester, using tic-tac-toe as the distributed application, the class will define, develop, and test protocols that iteratively add reliability to the game. The protocols will be defined by the class, and interoperability amongst the student projects is essential (just like in the real world!). The applications will be written in the C programming language, so students should have some familiarity with that language. Students in the course will implement a robust distributed application that can withstand outages that are typical in networked environments. Additionally, the students will get to explore the tradeoffs between single threaded and multi-threaded server implementations. Prerequisite: CSCI 3761

### **CSCI 3800-002 Unix Systems Programming, Nam**

This project based course will provide information and hands-on experience in developing complex system software using C programming languages on Unix/Linux computing environment. Topics covered will include the fundamental concepts of UNIX/Linux, process & thread, basic and advanced I/O, file systems, signals, concurrency control, inter-process communication, network programming, and software development tools on Unix/Linux system. Prerequisite: CSCI 2421

### **CSCI 3800-H01 Database Systems Applications, Tools & Techniques, Pastorino**

The goal of this course is to introduce the following topics on database design and implementation:

- Query Processing and Optimization
- Transaction Processing and Concurrency Control
- Active Database Development (triggers)
- Database Security Models
- CSCI4800 - Spring 2021 - Syllabus 3
- NoSQL and Distributed databases
- Spatio-Temporal Databases

Prerequisite: CSCI 3287

### **CSCI 4800-001 Advanced Mobile and Ubiquitous Systems, Li**

This course covers various aspects of mobile and ubiquitous systems to provide an in-depth understanding of principles, state-of-the-art solutions and challenges in design and implementation of such systems. Prerequisite: CSCI 3761 & 3453

### **CSCI 4800-002: Computational Motor Control, Al Borno**

This course introduces techniques for the modeling, simulation and control of movement. These techniques come from computer graphics, robotics and machine learning. The topics that we will cover include robot modeling, trajectory optimization, feedback control, deep reinforcement

learning, the neuroscience of movement, and neural network models of the brain. At the end of the course, students will learn how to train control policies for virtual agents in computer animation or robotics applications. Students will complete a course project. Pre-req: CSCI 3412 & familiarity with linear algebra and probability.