Spring 2022 BACS Undergraduate Electives

Schedule and course listings subject to change

- **CSCI 3515 Internet of Things: Sensing, Communication & Control**, He
  - Pre-requisite: CSCI 2421
- **CSCI 3740 Computer Security**, Brown
  - Pre-requisite: CSCI 2421
- **CSCI 3761 Intro to Networks**, Ra
  - Pre-requisite: CSCI 2421
- **CSCI 3800-002 Unix Systems Programming**, Nam
  - Pre-requisite: CSCI 2421
- **CSCI 3800-H01 Database Systems Applications, Tools & Techniques**, Pastorino
  - Pre-requisite: CSCI 3287
- **CSCI 3916 Web API**, McCarthy
  - Pre-requisite: CSI 2421
- **CSCI 4110 Applied Number Theory**, Gethner
  - Pre-requisite: CSCI 2511 or MATH 3000
- **CSCI 4408 Applied Graph Theory**, Gethner
  - Pre-requisite: CSCI 2511 or MATH 3000
- **CSCI 4034 Theoretical Found. of Computer Science**, Altman
  - Pre-requisite: CSCI 3412
- **CSCI 4800-002 Computational Motor Control**, Al Borno
- Pre-requisites: CSCI 3412 & familiarity with linear algebra and probability
- **CSCI 4929 Internship – please meet with your advisor.**
  - Pre-requisite: CSCI 3508 & approval through ELC

Requires at least one pre-req not part of BACS Core

- **CSCI 3453 Operating Systems,** Lakhani
  - Pre-requisites: CSCI 2525 & 3412
    - Required for the Cybersecurity and Secure Computing (CSSC) Certificate
- **CSCI 3800-001 Network Programming**, Ogle
  - Pre-requisites: CSCI 3761
- **CSCI 4650, Numerical Analysis,** Math Dept – MW 5:00-6:15
  - Pre-requisites: MATH 2411 & 3195
- **CSCI 4565 Introduction to Computer Graphics**, Choi – MW 3:30-4:45
  - Pre-requisites: CSCI 3412 & MATH 3195 or 3191
- **CSCI 4580, Data Science**, Banaei-Kashani
  - Pre-requisites: CSCI 3287, CSCI 3412 & MATH 3195
- **CSCI 4741 Principles of Cybersecurity**, Jafarian
  - Pre-requisite: CSCI 3287 & 3761
    - Required for the Cybersecurity and Secure Computing (CSSC) Certificate

Please see your advisor for additional CS Technical Elective choices.

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 4800-002: 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 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.