All courses are remote unless indicated and require attendance via Zoom during class time.

Spring 2020 BACS Undergraduate Electives

- **CSCI 3515 Internet of Things: Sensing, Communication & Control**, He – Online  
  o Pre-requisite: CSCI 2312 & 2421  
  o Will meet on campus Wednesdays week 1 and the last 2 weeks
- **CSCI 3560, Probability and Computing**, Lakhani – Online  
  o Pre-requisites: CSCI 2511 and MATH 2411
- **CSCI 3761 Intro to Networks**, Ra – MW 2:00-3:15  
  o Pre-requisites: CSCI 2312 & 2421
- **CSCI 3916 Web API**, McCarthy – MW 3:30-4:45  
  o Pre-requisite: CSCI 2312 & 2421
- **CSCI 4408 Applied Graph Theory**, Gethner – TTH 2:00-3:15  
  o Pre-requisite: CSCI 2511 or MATH 3000
- **CSCI 4800-001 Security & Cryptography**, Gethner – TTH 12:30-1:45  
  o Pre-requisites: CSCI 3412
- **CSCI 4800-002 Computational Modeling of Animal Movement**, Al Borno – TTH 9:30-10:45  
  o Pre-requisite: CSCI 3412
- **CSCI 4800-003 Adv Topics of Database Systems**, Debnath – MW 3:30-4:45  
  o Pre-requisites: CSCI 3287
- **CSCI 4800-E01 Web Application Development**, Jafarian – Online  
  o Pre-requisite: CSCI 3287

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

- **CSCI 3800-001 Network Programming**, Ogle – Hybrid MW 11:00-12:25  
  o Pre-requisites: CSCI 3761
- **CSCI 4650, Numerical Analysis**, Math Dept – MW 5:00-6:15  
  o Pre-requisites: MATH 2411 & 3195
- **CSCI 4565 Introduction to Computer Graphics**, Choi – MW 3:30-4:45  
  o Pre-requisites: CSCI 3412 & MATH 3195 or 3191
- **CSCI 4741 Principles of Cybersecurity**, Debnath – MW 2:00-3:15  
  o Pre-requisite: CSCI 3287 & 3761  
    • Required for the Cybersecurity and Secure Computing (CSSC) Certificate
- **CSCI 4931 Deep Learning**, Biswas - MW 11:00-12:15  
  o Pre-requisites: CSCI 3412 & MATH 3195

Please see your advisor for additional CS Technical Elective choices.
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 4800-001 Security & Cryptography, Gethner

A broad overview of cryptography and its relation to computer security. Topics include basic standard cryptographic techniques, a history of codes and ciphers, RSA, DES, AES, Elliptic Curve Cryptography, ElGammal, and applications to current and future technologies. Prerequisite: CSCI 3412

CSCI 4800-002 Computational Modeling of Animal Movement, Al Borno

Understanding intelligence (visual, social, motor, etc.) is one the most fascinating problems of our time. One approach to understand intelligence is by synthesizing intelligent agents or reverse-engineer the brain. We will discuss the benefits and pitfalls of this approach, and see how can we reverse-engineer the brain to understand how it generates movements and build better robots.

Some of the topics we will cover:
- Robotics
- Computer Animation of Human Movement
- What can deep learning and artificial neural networks tell us about actual neural data in the brain?
- Computational Neuroscience
- Computational Modeling

In the class, we will read research papers and discuss them (what are the flaws in the analysis or presented evidence? Possible improvements or future work?). Discussion and debate are
encouraged. The goal of the class is not to cover a set of specific technical requirements, but rather to encourage independence, curiosity, and interest in these questions.

I video of example course projects:
https://www.dropbox.com/s/16nk1mcr9hrur3y/CSCI4800.mp4?dl=0

**CSCI 4800-003 Adv Topics of Database Systems**, Debnath

Topics will include concurrency control, query optimization, Transaction processing, Recovery techniques, distributed database, Active database, Spatio-temporal database. Prerequisite: CSCI 3287

**CSCI 4800-E01 Web Application Development**, Jafarian

This project-oriented course introduces fundamentals of full-stack web application development, using MERN stack (MongoDB, Express.js, React, and Node.js). Major topics include handling HTTP requests and responses, tracking sessions and cookies, accessing and manipulating the data securely, authentication and authorization, and separating content from presentation through the use of the MVC architectural pattern. Particular attention will be paid to methods for making Web applications user-friendly, platform-aware, efficient, maintainable, and flexible. Additional topics include quick overview of HTML5, CSS3, Bootstrap library, and introduction to secure coding for Web applications. At the end of this course, students will be able to build their own browser-based applications for e-commerce and other applications that require Web access to server-based resources. Prerequisite: CSCI 3287