

Spring 2023 BACS Technical Electives

Schedule and course listings subject to change

- **CSCI 3761 Intro to Networks**, Ra
 - Pre-requisite: CSCI 2421
- **CSCI 3751 Unix Systems Programming**, Nam
 - Pre-requisite: CSCI 2421
- **CSCI 3800-H01 Next-Gen CyberThreats & GANs**, Pastorino
 - Pre-requisites: CSCI 3287 & 3412
- **CSCI 3916-002 Web API**, McCarthy
 - Pre-requisite: CSI 2421
- **CSCI 3920 Adv. Programming w/Java & Python**, Pastorino
 - Pre-requisite: CSCI 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 4620 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, 2.75 GPA & 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 3762-002 Network Programming**, Ogle
 - Pre-requisites: CSCI 3761
- **CSCI 4650, Numerical Analysis**, Math Dept
 - Pre-requisites: MATH 2411 & 3195
- **CSCI 4580, Data Science**, Banaei-Kashani
 - Pre-requisites: CSCI 3287, CSCI 3412 & MATH 3195
- **CSCI 4591 Computer Architecture**, Ricciardella
 - Pre-requisite: CSCI 2525
- **CSCI 4743, Cyber & Infrastructure Defense**, Jafarian
 - Pre-requisite: CSCI 3761
 - Required for the Cybersecurity and Secure Computing (CSSC) Certificate

Please see your advisor for additional CS Technical Elective choices.

Computer Science Free Electives:

- **CSCI 1510 Logic Design**

- **CSCI 2525 Assembly Language**
- **CSCY 2930 Practical System Administration**

CSCI 3800-H01 Next-Gen CyberThreats & GANs,

Description: Machine Learning and Deep Learning provide with many useful tools when it comes to cybersecurity, allowing for advanced detection and protection mechanisms for securing our data. However, the same tools used to protect our data can be used to exploit security issues. In the last years, Deepfake and Generative Adversarial Networks (GAN) positioned an important security risk by allowing a person to generate videos with the image of someone else. Recently, researchers have demonstrated the versatility of these networks by creating the first AI-generated painting. With all these tools available, are we sure we can trust our eyes? Are we sure that we are buying an original piece of art and not an AI-generated counterfeit? Are we sure that our contacts in social media are who they say they are?

This course introduces Generative Adversarial Networks and navigate deeper in the uses of these networks with a strong focus on cybersecurity applications. We will learn how to create and apply these networks by means Python libraries like TensorFlow, Theano and Pytorch and developing applications capable of leveraging GPU-based environments.