SCHOOL OF ENGINEERING

Center for Communications and Engineering
203-582-7985 (central office)

Administrative Officers

<table>
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Programs

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<tr>
<th>Program</th>
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<tbody>
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Master of Science

- Cybersecurity (http://catalog.qu.edu/graduate-studies/engineering/cybersecurity)

Dual-Degree Program

- Dual-Degree BA/MS or BS/MS in Cybersecurity (http://catalog.qu.edu/engineering/engineering/cyber-dual-degree) (4+1)

Cybersecurity (CYB)

**CYB 501. Foundations of Cyber Security.** 1 Credit.
This course introduces students to fundamental security principles and security defense. Students learn the concepts of information security risks, vulnerabilities, assets and threats.
**Offered:** Every year, Fall and Spring

**CYB 502. Introduction to Cyber Threats.** 1 Credit.
This course introduces students to the analysis of cyber threats. Students learn to identify bad actors in cyberspace and assess their resources, capabilities, techniques and motivations. Students learn to describe different types of cyber attacks and their characteristics.
**Corequisites:** Take CYB 501.
**Offered:** Every year, Fall and Spring

**CYB 503. Introduction to Cyber Defense.** 1 Credit.
Students learn about cyber defense tools and techniques. This course covers how to apply cyber defense tools and techniques to prepare a system to repel attacks.
**Corequisites:** Take CYB 502.
**Offered:** Every year, Fall and Spring

**CYB 504. Introduction to Secure Networking.** 1 Credit.
This course introduces students to the theoretical and practical aspects of designing, developing and defending computer networks. Topics include network models, media, architectures, devices, protocols, services, applications and use of network security tools.
**Offered:** Every year, Spring and Summer

**CYB 509. Operating Systems Security.** 1 Credit.
This course introduces students to operating systems and the software to support these systems. Topics include operating system security configuration, control objectives, control maintenance and forensics. The course includes hands-on implementation of security controls, including access management, file and process security configuration, and security monitoring.
**Prerequisites:** Take CYB 540;
**Offered:** Every year, Spring and Summer

**CYB 517. Introduction to Cryptography.** 1 Credit.
This course introduces students to cryptography algorithms, protocols and applications. Topics include history; applications, such as SSL and SSH; and protocols, such as hash functions, symmetric and asymmetric cryptography, and attack-vectors for systems.
**Prerequisites:** Take CYB 509.
**Offered:** Every year, Spring and Summer

**CYB 524. Relational Database Security.** 1 Credit.
This course introduces students to different relational database management systems (DMS) and DMS security concerns and methods. Topics covered include hashing and encryption, database access controls, unauthorized access, data corruption and injection.
**Prerequisites:** Take CYB 517.
**Offered:** Every year, Spring and Summer

**CYB 526. Non-Relational Database Security.** 1 Credit.
This course introduces students to the theory, application and security of nonrelational database systems. It focuses on data management, query and security aspects of nonrelational databases. Topics include a comparison between relational and nonrelational database models, NoSQL storage types for different databases such as MongoDB, Hadoop, Amazon DynamoDB, document-based databases and graph databases.
**Prerequisites:** Take CYB 524.

**CYB 550. Cyber Policy.** 3 Credits.
There are three parts to this course. The first part covers the applicable federal and state laws and policies related to cyber defense, pertaining to the storage and transmission of data. In the second part, students analyze and develop enterprise security policies. Finally, students learn how to implement machine security policies.
**Corequisites:** Take CYB 503.
**Offered:** Every year, Fall and Summer
CYB 660. Programming for Security Analytics. 1 Credit.
This course introduces students to basic command-line methods used in machine data analytics. Student learn how to collect machine logs, search log data, and identify anomalies in logs.
Corequisites: Take CYB 506.
Offered: Every year, Summer

CYB 661. Programming for Security Automation. 1 Credit.
This course focuses on programming methods that are applicable to security automation. Students gain experience in automation using Python and Cloud native CLI to facilitate such tasks as automated code scanning; automated application scanning in testing and staging; automated network, server, container configuration checks; and continuous monitoring of development pipeline components and job scheduling.
Prerequisites: Take CYB 506.
Offered: Every year, Summer

CYB 662. Secure Web Applications Design. 1 Credit.
This course covers the design and architecture of secure web applications, such as: traditional three-tier architectures, SOA, microservices, FaaS; application protocols; authentication and session management; client and server-side controls; input-based vulnerabilities and web application attack trends.
Prerequisites: Take CYB 661.
Offered: Every year, Fall and Summer

CYB 663. Secure Web Applications Engineering. 1 Credit.
In this course, students learn processes and practices needed to secure applications within the Software Development Life Cycle (SDLC). The course covers traditional SDLC processes and methods to secure modern Cloud native development processes and using concepts of DevSecOps.
Corequisites: Take CYB 662.
Offered: Every year, Fall and Summer

CYB 664. Web Applications Security Testing. 1 Credit.
This course introduces students to web application security testing. Topics include application security metrics, selecting the right testing tool and integrating the results into the development life cycle. Students gain hands-on experience using these tools in practical settings.
Corequisites: Take CYB 663.
Offered: Every year, Fall and Summer

CYB 665. Workforce Access Security. 1 Credit.
This course focuses on authentication and user access technologies and practices within the enterprise. Topics include Active Directory services and architecture, and enterprise network access protocols.
Prerequisites: Take CYB 517.
Offered: Every year, Fall

This course focuses on authentication and user access technologies and practices within B2C access. Topics include standards-based B2C authentication and access management protocols.
Prerequisites: Take CYB 665.
Offered: Every year, Fall

This course covers access concepts based on B2B communication APIs, such as standard-based protocols and B2B on-boarding, for mobile, social and IoT applications.
Prerequisites: Take CYB 667.
Offered: Every year, Fall

CYB 670. IoT Security. 1 Credit.
This course covers security as it pertains to embedded devices, embodied by the Internet of Things (IoT). Students learn about the specific security issues related to embedded devices, including Linux malware, DDoS attacks, botnets, cryptography and personal privacy.
Prerequisites: Take CYB 526.
Offered: Every year, Spring and Summer

CYB 680. Introduction to Cloud Security. 1 Credit.
In this course, students learn fundamentals of Cloud computing and Cloud security. This course covers topics such as shared responsibility models for IaaS, PaaS, SaaS and FaaS, and Cloud Security Alliance CCM. Students get hands-on experience creating secure systems within a commercial Cloud vendor environment.
Prerequisites: Take CYB 669.
Offered: Every year, Fall

CYB 681. Securing Workloads in AWS. 1 Credit.
This course covers concepts and practices for securing AWS workloads. Students are introduced to security controls, such as access controls using IAM, logging and auditing, and other AWS security services.
Prerequisites: Take CYB 680.
Offered: Every year, Fall

CYB 682. Securing Workloads in Azure. 1 Credit.
This course covers concepts and practices for securing Azure workloads. Students are introduced to security controls, such as access controls using IAM, logging and auditing, and other AWS security services.
Prerequisites: Take CYB 681.
Offered: Every year, Fall

CYB 683. Resilient System Design and Development. 1 Credit.
This course introduces students to the concepts of secure system design and cyber resilience. The content of this course includes best security processes recommended in NIST 800-160 and techniques and technologies needed for secure system design and development.
Prerequisites: Take CYB 682.
Offered: Every year, Spring

CYB 684. Resilient System Testing. 1 Credit.
This course introduces students to state-of-the-art concepts and methods to evaluate cyber resiliency. Topics include breach and attack simulation, configuration assessment and compliance. Hands-on experience with systems testing tools is part of this course.
Prerequisites: Take CYB 683.
Offered: Every year, Spring

CYB 685. Operating Resilient Systems. 1 Credit.
This course includes hands-on experience with tools for security activities such as intrusion detection and cloud security monitoring. Other topics this course covers include Site Reliability Engineering (SRE), maintaining situational awareness and dynamic threat.
Prerequisites: Take CYB 684.
Offered: Every year, Spring

CYB 691. Capstone I. 1 Credit.
This course enables students to explore the computer security profession by working independently or in teams, under the guidance of a mentor, on a significant security-related project. In the first part of this two-course sequence, students review professional literature and explore security ethics, as they work to develop and present a capstone project proposal in written and oral form.
Corequisites: By permission of director only.
Offered: Every year, Fall
CYB 692. Capstone II. 2 Credits.
This course enables students to explore the computer security profession by working independently or in teams, under the guidance of a mentor, on a significant security-related project. In the second part of this two-course sequence, students complete work on their project and create an appropriate formal presentation of their results.

Prerequisites: Take CYB 691.
Offered: Every year, Fall