CCA CYBER SECURITY TRACK

A detailed description of the advanced cyber security track.

Courses to be offered in the CCA

Advanced Cyber Security Track

2013-2014 School Year

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Executive Summary

In 2009 I started developing the Advanced Cyber Security Track. I researched what fundamental skills industry was looking for in entry level candidates. What certificates did industry accept as validation for those skills? What courses best developed the fundamental skills industry was looking for and prepared students for certifications that industry accepted. What sequence of those courses logically developed those skills, built a strong foundation, and prepared students for certifications. What course materials best facilitated instruction and learning in those courses. Lastly, what instructional methods were best for those courses? The end result is the Advanced Cyber Security Track.

-Mike Miklich, Cyber Security Program Founder

IT Essentials (Freshman Year)

Fall & Spring – IT Essentials 1 & 2 (1 Credit) "CompTIA A+"

This course is an overview of computer architecture, which stresses the underlying design principles and the impact of these principles on computer performance. General topics include design methodology, processor design, control design, memory organization, system organization, and parallel processing. We will be using the CompTIA A+ book for the instructional material, lab exercises and quizzes. It is suggested students be required to pass the CompTIA A+ practice certification exam at the end of this course to receive credits, and in order to continue with the Cyber Security program.

Suggested Student Learning Outcomes

CompTIA A+ Certification

Testout A+ Certification

Cyber Defense I & II (Sophomore Year)

Fall – Computer Networks (1/2 Credit) "CompTIA Network+"

This course is an introductory look at computer communication from an engineering perspective. It will focus on the principles of computer communication and the basic concepts in the architecture of computer networks. As an introductory course, it covers a broad set of concepts and implementations, addressing both theory and practice, using the layered model of computer communications. Labs are used to reinforce concepts and develop practical networking skills. We will be using CompTIA Network+ book for the instructional material, lab exercises and quizzes. It is suggested students be required to pass the Network + practice certification exam at the end of this course to receive credits, and in order to continue with the Cyber Security program.

Spring – Advanced Computer Networks – Hardening Basics (1/2 Credit)

This course proposes to introduce the student to the identification of vulnerabilities, forms of attack, appropriate countermeasures, and the detection and defense of the same. Tools and techniques for the securing of hardware, software and data, including physical security are covered. The issues and facilities available to both the intruder and administrator will be examined and evaluated with appropriate exercises to illustrate their effect. The textbook used for this course is "All In One CompTIA Security+, with labs to support the learning process.

Suggested Student Learning Outcomes

CompTIA Network+ Certification

Testout Network Certification

CompTIA Security+ Certification

Testout Security Certification

Programming and Data Structures I & II (Junior Year)

Fall – Programming and Data Structures I (1/2 Credit)

Using the C++ programming language, this course introduces algorithmic problem solving, basic control and data structures, and procedural abstraction. Topics include language syntax and semantics, arithmetic expressions, operators, functional decomposition, functional calls and parameters, file input and output, identifier scope and lifetime, switch and loop structures, array processing, strings, searching and sorting. The class will use Starting out with C++ textbook, and be instructor led, with labs.

Spring – Advanced Programming JAVA (1/2 Credit)

The Object-Oriented Programming course is a study of concepts, terminology, and methodologies used in object-oriented systems, languages, and applications. Students will design and implement software systems using object-oriented analysis and design techniques. The purpose of this course is to develop a thorough understanding of object-oriented (OO) design, systems, and applications. The lecture portion of the course will emphasize both OO design concepts and language specific applications. Programming assignments will provide students with experience in an object-oriented programming language, namely JAVA. Also, comparisons will be made to OO design concepts in C++. The textbook used for this course will be Java for the Absolute Beginner

Suggested Student Learning Outcomes

C++ Portfolio

JAVA Portfolio

System Admin I & II (Junior Year)

Fall – Computer Systems Technology I (1/2 Credit)

System Administration I topics focus on Microsoft Windows 2008. This course is designed to provide students with essential knowledge and skills to implement, administer, and troubleshoot servers in a networked environment. Operating system concepts, such as installing a standalone system, file systems authentication, and user support services are explored. Topics will include security issues, user and group administration, active directory services, DHCP, DNS, SSH, backup and restoration strategies and techniques, integrated mass storage technologies and alternative client technologies. The class will use Configuring Windows server 2008 Active Directory textbook, and be instructor led with, with labs delivered through the Microsoft IT Academy E-learning suite.

Spring – Computer Systems Technology II (1/2 Credit)

System Administration II topics focused on the Linux operating system. This course is designed to provide students with essential knowledge and skills to implement, administer, and troubleshoot servers in a networked environment. Operating system concepts, such as installing a standalone system, file systems authentication, and user support services are explored. Topics will include security issues, user and group administration, directory services, DHCP, DNS, SSH, electronic system update and maintenance, backup and restoration strategies and techniques, integrated mass storage technologies and alternative client technologies. The class will use the textbook "A Practical Guide to Ubuntu Linux", be instructor led, with labs.

Suggested Student Learning Outcomes

MCITP Exam 70-646 or MTA Windows Fundamentals and MTA Server Fundamentals

CompTIA Linux+

Ethics & Survey of Programming Languages (Senior Year)

Fall – IT Fundamentals - Skills for Computing Professionals – Ethics (1/2 Credit)

The Skills for Computing Professionals will focus on the professional skills that computer scientists will need to be successful in their careers and lives. There are two key areas of study, communication skills needed by computer scientists and their ethical responsibilities. Communication skills will include writing and giving oral presentations about computer science topics and life skills. Ethical issues will be explored from a computer science perspective.

Spring – Internship or Senior Project (1/2 Credit)

The students will intern and journal their productivity, meeting as a class on a weekly basis to discuss their experiences.

If no internship program is available students will work on a senior project

Suggested Student Learning Outcomes

Comprehensive Computer Scientist Ethical Responsibilities Report

Internship or Senior Project

Cybersecurity Essentials (Senior Year)

Fall – IT Programming - Survey of Programming Languages (1/2 Credit)

The Survey of Programming Languages course is a collection of selected programming languages for students familiar with programming. Students will write programs in a broad variety of languages, with an emphasis on Python. Students at the conclusion of this course will be familiar with Ruby, Perl, XHTML and Python. Textbooks used for this course will include Ruby Programming for the absolute beginner, Perl Programming for the absolute beginner, Python Programming for the absolute beginner and HTML, XHTML, & CSS for the Absolute Beginner.

Spring – IT Programming - System Penetration Testing (1/2 Credit)

This class will immerse the students into a hands-on environment where they will be shown how to conduct penetration testing. They will be exposed to an entirely different way of achieving optimal information security posture in their organization. They will scan, test, penetrate and secure their own systems. The lab intensive environment gives each student in-depth knowledge and practical experience with the current essential security systems. Students will begin by understanding how perimeter defenses work and then be lead into scanning and attacking their own networks, no real network is harmed. Students then learn how intruders escalate privileges and what steps can be taken to secure a system. Students will also learn about Intrusion Detection, Policy Creation, Social Engineering, DDoS Attacks, Buffer Overflows, Virus Creation and others. EC-Council textbook on CEHv8 will be used in this course.

Suggested Student Learning Outcomes

Python, Ruby, and Perl Portfolios

CEH Certification

Additional recommended courses of studies

Introduction to Logic

Study of correct reasoning, including the recognition, analysis, and criticism of arguments; relevant topics include informal fallacies, syllogistic reasoning, and systems of deduction. Each one of us wants to think clearly and correctly. Logic helps us to do this by studying the forms that valid reasoning takes. This course will treat both informal and formal logic. We will cover common rhetorical fallacies, classical syllogistic logic, and propositional logic. The course aims to provide students with the tools needed to improve their critical thinking and inference skills.

Introduction to Statistics

Statistics has become known as the mathematical tool or approach for analyzing data in order to draw reliable conclusions. This course will consider the most useful statistical methods; identify the statistical methods most widely used in education, psychology, and the social sciences; and study the mathematical formulas that are used in statistical applications. Prerequisite: MTH 113 or MTH 123. The textbook used for this course will be Statistics for the Utterly Confused.

Design and Analysis of Algorithms

In this course you will learn several fundamental principles of algorithm design: divide-and-conquer methods, graph algorithms, practical data structures (heaps, hash tables, search trees), randomized algorithms, and more.

For more information about the organization we partner with (iForCE) and the Advanced Track, visit www.iforce.me