A FLIPPED CLASSROOM APPROACH ENABLEMENT TO CYBERSECURITY EDUCATION

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INTRODUCTION

- With the growing importance of Cloud Computing, big data/analytics and other IT programs, cybersecurity has received increasing attention in recent years

- The rapid growth in these fields has created a shortage of IT practitioners with and information security background

- A recent NSF workshop has emphasized the need for better security education in Undergraduate Computer Science and Engineering programs and the need to treat cybersecurity as a multidisciplinary skill

- It can be quite challenging to prepare students for IT careers in this rapidly evolving field, or to integrate these offerings into a more traditional undergraduate engineering curriculum

- We discuss a new undergraduate program in cybersecurity for CET students using a version of the flipped classroom approach

CYBERSECURITY EDUCATION GOALS

Contributing to a diverse engineering work force

Enrollment & Background

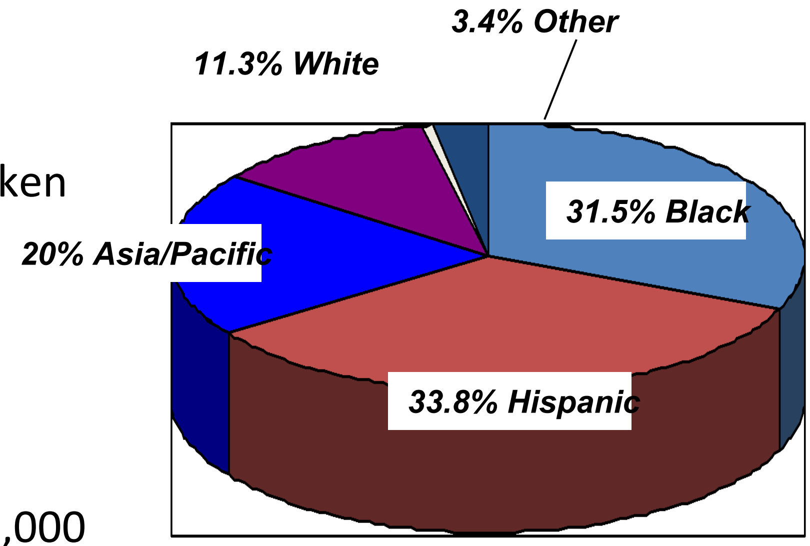
16,208 students, 65% full time

58% female

38.1% born outside of US

61% report language other than English spoken at home

67% are the first in their families to attend college



Financial Need

61% report household income less than $30,000

80% incoming freshmen receive need-based aid

19% work more than 20 hours per week

New York City College of Technology
The College of Technology of The City University of New York

- ***As an ABET accredited, open access institution, City Tech's historic mission has been to offer opportunities for educational advancement to students regardless of financial circumstances or prior academic achievement.***

- ***City Tech is a federally designated Hispanic Serving Institute (HSI)***

CYBERSECURITY EDUCATION GOALS

The fundamental concepts which our students should understand after successfully completing this course of study Include:

- **Understand a basic introduction to cybersecurity principles and best practices**

- **Understanding recent use cases in information security as a basis for future threat assessment**

- **Hands-on experience with penetration testing environment and implementations using open source code and hacking tools**

FLIPPED CLASSROOM APPROACH

The flipped classroom is a pedagogical model

There in no single model for the flipped classroom

- **The term is widely used to describe almost any class structure that provides students with resources (*such us reading assignments*) which are to be studied prior to regular class meetings.**
- **Instructors function as coaches or advisors, encouraging students to individually pursue their interests and collaborate on class projects**
- **This approach draws from other educational concepts such as active learning, student engagement, and hybrid course design**

INSTRUCTIONAL MATERIALS

- **Book(s):** Penetration Testing, Applied Information Security; plus several other reference materials
- **Virtual Laboratory:** VMware Workstation, VirtualBox, KVM, etc., with several VMs containing Windows 7, Windows 8, Kali Linux and various other Linux distributions based on available resources for the host platform
- **Kali Linux** and its many tools are used for penetration testing – The course also uses other free software not included in Kali Linux distribution
- **CAINE** A Forensics Analysis Distribution

ACADEMIC & INDUSTRY COLLABORATION

- The growing field of cybersecurity is a good candidate for nontraditional approaches to Education & Research

- Marist College has established a test bed for next generation cloud computing research – It also hosts cloud workloads for local businesses and government organizations

- Also MARIST has formed academic partnerships with other public, private, and Ivy League schools, including NYCCT – CUNY as well as industry partners including IBM, BROCADE, CIENA and ADVA

CONCLUSIONS

- The industry-wide emphasis on cybersecurity and penetration testing has driven a renewed focus on the education process for Information Security Professionals
- Our approach appears to be particularly well suited to engaging nontraditional and under-represented students because of its practical, hands-on focus and engagement with other academic and industry partners
- The curriculum does not require extensive prerequisites, and can be deployed quickly at very low startup cost in an isolated, inherently secure student training environment
- We have begun to make this technology accessible to a student population which includes a high percentage of under-represented students, enabling them to pursue opportunities with leading financial companies and other employers

THANK YOU!!!