APPLICATIONS IN CYBERSECURITY PROGRAM

A ten-week program covering advanced cyber protections for Internet-of-Things (IoT) and Industrial Control Systems utilizing extensive hands-on experimentation with the latest tools and technologies

DePaul University's Applications in Cybersecurity Program provides security professionals with a comprehensive and in-depth overview of the key principles and issues involved in protecting IoT and Industrial Control Systems (ICS).

The program is ideally suited for security analysts, network and software engineers, security managers, technology managers and others who are responsible for the planning and implementation of advanced protections for Internet-of-Things (IoT) and Industrial Control Systems (ICS) deployments. The curriculum is designed to be accessible and useful to managers, but also offers an extensive hands-on experimentation with the latest IoT and ICS technology for those in more technical roles.

Program content consists of lectures and demonstrations complemented by class discussion and hands-on labs. Students will be expected to actively participate in class discussions and collaborative group activities. Reading assignments, case studies, and projects will be assigned. Lab experimentation will use machines running Microsoft Windows® and Kali Linux™ operating systems. Laptops will be available for use during in-class labs, but students are welcomed to bring their own laptops running these readily available operating systems.

YOU WILL BE ABLE TO:

- Understand the cyber-physical systems security principles of confidentiality, integrity, availability, non-reputation, veracity, and plausibility
- Recognize the vulnerabilities in the structure of Internet of Things (IoT) and Industrial Control Systems (ICS) deployments that make cybersecurity exploits possible
- Experiment with penetration tools and techniques for IoT and ICS cybersecurity testing
- Perform cybersecurity risk assessment of cyber-physical deployments like IoT smart houses, IoT smart healthcare, ICS, Intelligent Transportation Systems, and smart grids
- Learn the legal and privacy aspects of cyber-physical systems
- Understand the role of cyber-physical systems in cyber warfare
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CURRICULUM

CYBER PHYSICAL SYSTEMS SECURITY OVERVIEW

Concepts and principles of Cyber-Physical Systems Security (CPSS): confidentiality, integrity, availability, non-reputation, veracity, and plausibility. Impacts of cyber-physical attacks. Comparison between ICT and CPS with respect to requirements for performance, reliability and risk management; system operation; resource constraints; communication; change management; and, component management.

SECURITY BREACHES AND DEFENSES


INDUSTRIAL CONTROL SYSTEMS (ICS)/SCADA SECURITY

Computing, physical, and networking components’ in ICS/SCADA: PLCs (Ladder Logic), HMI, Modbus/Profibus TCP; Vulnerabilities in ICS/SCADA systems; Penetration testing, security assessment, and protection configuration for ICS/SCADA

IoT SECURITY

Computing, physical, and networking components’ in IoT: Sensors and actuators, LoPAN and WiFi communication; Vulnerabilities in IoT systems; Penetration testing, security assessment, and protection configuration for IoT deployments.

LEGAL AND PRIVACY ISSUES

Privacy laws for cyber-physical systems, Regulation: FTC and FCC protections for unfair and deceptive security practices for cyber-physical systems

RISK MANAGEMENT

Application of NIST Cybersecurity Framework for Critical Infrastructure and Cyber Physical Systems

CYBERWARFARE AND THE FUTURE

Cyberwarfare laws and international conventions, use of force and retaliation relative to cyber-physical systems.

GENERAL INFORMATION

ADMISSION

Professional work experience in the administration, support, management, or risk assessment of security services is recommended. Applicants are expected to have basic security knowledge (identification, authentication, access control; encryption and integrity protection), knowledge of Internet services (TCP/IP protocol stack), and basic knowledge of unix-based operating systems.

A substantial commitment of time is required for this intensive course of study. Final admission will be determined by the admissions committee on the basis of an applicant's overall qualifications, including
work history and educational background.

IN-CLASS LAB EXERCISES
Students will be assigned hands-on lab exercises at regular intervals through the course to reinforce concepts learned. Required lab exercises will include configuration for Industrial Control Systems (ICS) and Internet-of-Things (IoT) deployments, Firewall and IDS configuration for ICS, and security assessments/pentesting of ICS and IoT deployments with Metasploit and Kali Linux tools. All lab exercise will be performed as a class activity where students are encourage to collaborate in the experimentation. All the ICS and IoT elements will be provided by DePaul CDM’s Cyber Physical Systems Security Lab.

SCHEDULE
The Institute offers one section of the program each quarter. Classes meet once a week at a specially-equipped classroom in DePaul’s Loop Campus.

FACULTY
The program is taught by Filipo Sharevski, PhD, Director of DePaul’s Information Assurance Center and an expert in cyber-physical systems and cellular networks security. He has established and currently leading two labs at DePaul University, the Secure Design Lab (SDL) and the Cellular Networks Security Lab (CNSL). The lab is focused on secure user interaction design for IoT products and systems. CNSL hosts research on advanced cyberattacks against LTE/LTE-A and future 5G cellular architectures like Cellular Internet of Things (CIoT). He has published in internationally recognized and peer reviewed journals, conferences and workshops. He is the author of the book "Mobile Network Forensics: Emerging Challenges and Opportunities" His research interests include future cellular networks, CIoT security, cyber physical systems security, and cyberforensics.
The college, through its School of Cinematic Arts, School of Computing, and its School of Design, offers a variety of programs at the undergraduate and graduate levels. Over 3,000 students are enrolled in the college’s bachelor’s programs and over 2,700 students are enrolled in the master's and Ph.D. programs making the college’s graduate program one of the largest in the country. The college offers more than 300 courses each quarter, many in the evening, and primarily in the Loop and Lincoln Park Campuses. Most of the degree programs are also available exclusively online.

**Offerings at the undergraduate level include:**

- Animation B.A. / B.F.A.
- Computer Science B.S.
- Cyber-Physical Systems Engineering B.S.
- Data Science B.S.
- Film and Television B.A. / B.F.A.
- Game Design B.S.
- Game Programming B.S.
- Graphic Design B.F.A.
- Information Systems B.S.
- Information Technology B.S.
- Interactive and Social Media B.S.
- Math and Computer Science B.S.
- Network Engineering and Security B.S.

**Offerings at the graduate level include:**

- Animation M.A.
- Applied Technology M.S.
- Business Information Technology M.S.
- Computational Finance M.S.
- Computer Science M.S.
- Cybersecurity M.S.
- Digital Communication and Media Arts M.A.
- E-Commerce Technology M.S.
- Experience Design M.A.
- Film and Television M.S.
- Game Programming M.S.
- Health Informatics M.S.
- Human-Computer Interaction M.S.
- Information Systems M.S.
- IT Project Management M.S.
- Network Engineering and Security M.S.
- Predictive Analytics M.S.
- Product Innovation and Computing M.S.
- Software Engineering M.S.
- J.D./M.S. in Computer Science Technology

**Master’s of Fine Arts**

- Animation
- Creative Producing
- Film and Television
- Documentary
- Game Design
- Screenwriting

**Ph.D. in Computer and Information Sciences**

**Ph.D. in Human Centered Design**

The Institute for Professional Development was formed by the college in 1984 to assist both individuals and businesses in keeping pace with the rapid development of computer technologies. The Institute currently offers a variety of intensive certificate programs in these areas:

- Advanced SQL
- Big Data and NoSQL
- Big Data Using Hadoop
- Big Data Using Spark
- Cloud Computing Technologies
- Data Science for Business
- Fundamentals of R
- Introduction to SQL
- iOS Developer
- IPv6
- Java™ Developer
- Modern Information Technology
- Modern .NET Web Developer
- SQL Server® Business Intelligence
- SQL Server® Database Administration
- Technology and Innovation
- Web Development with JavaScript and HTML5

**Application Procedure:**

Complete the enclosed application and return it with a non-refundable $40.00 application fee (check or money order made payable to DEPAUL UNIVERSITY) to:

DePaul University
Institute for Professional Development
Applications in Cybersecurity Program
243 S. Wabash Avenue, Room 301
Chicago, IL 60604-2300

The Applications in Cybersecurity Program at DePaul University is an independent program of study and is not affiliated with, nor has it been authorized, sponsored, or otherwise approved by any external entities.