Course Syllabus

Edit

EEE4717: Introduction to IoT Security; Section RVC

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Office Hours: By Appointment

Course Description and Purpose

In this class, the students will learn the topics related to the security of Internet-of-Things. Specifically, the students will have a chance to understand the realistic security solutions for IoT devices and applications. Both key security concepts (e.g., confidentiality, authentication, integrity, access control, non-repudiation, and availability) and the state-of-the art security solutions will be reinforced and explored.

Course Objectives

Cyber space is expanding fast with the introduction of new Internet of Things (IoT) devices. In IoT applications, humans and/or smart networked devices interact with and control the physical world around them through various IoT devices. For instance, smart watches, thermostats, glasses, fitness trackers, Internet-connected house appliances, vehicles, sensors, actuators, and robotic platforms (e.g., iRobot Create), have grown exponentially in a short span of time. It is estimated that on average, every eighty second, one device is assumed to be connected to Internet today and our everyday lives will be dominated by billions of smart connected devices by the end of this decade. Moreover, the IoT devices are key elements of our nation's critical infrastructure networks, including power plants, oil/gas pipelines, smart-grid, and nuclear plants. Unfortunately, these devices are under the constant threat of an increasing number of cyber attacks. Hence, students in this class will gain an understanding of the fundamental security concepts related to the IoT domains. The course will provide numerous realistic cases incorporating cutting-edge technology and current trends, giving students the opportunity to acquire the knowledge and skills they will need as working professionals. Some specific goals include:

- Students will learn the fundamental security mechanisms within the IoT realm.
- Students will understand the concepts in software and hardware architecture of the IoT devices.
- Students will learn the design principles for the IoT platforms.
- Students will understand the simple energy-efficient design principles for the IoT platforms.

- Students will demonstrate secure design principles for the state-of-the art IoT devices.
- Students will understand how to program the state-of-the art IoT devices.

Prerequisites or co-requisites

Programming coursework or any systems oriented courses (e.g., COP XXX), or any embedded systems coursework or instructor permission. Senior level undergraduate standings are expected. Both ECE and CS students (graduate or senior level undergraduate standings) are welcome.

Important Information

Before starting this course, please review the following pages:

- **Accessibility and Accommodation**
- **Academic Misconduct Statement**

*The professor reserves the right to change or modify the syllabus at any time during the semester.

Textbook information

Suggested (not mandatory) sources:

- Computer Security: Principles and Practice, ISBN 0-13-377392-2.
- Network Security Essentials, Prentice Hall, 5th, ISBN-10:013337043, ISBN-13: 8-0133370430.
- Advanced Android Application Development, 4/E, ISBN-10: 0133892387,
- Bulletproof Android: Practical Advice for Building Secure Apps, ISBN-10: 0133993329
- IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things

Hanes, Salgueiro, Grossetete, Barton & Henry, Cisco Press – Pearson Education

- Relevant recent research journal articles and conference papers.

Other supplemental materials

- Introduction to Android Application Development: Android Essentials, 4/e, 2014, Addison-Wesley ISBN-10: 0321940261.
- Beginning Android Programming: Develop and Design, Prentice Hall, 2014, ISBN-10: 0321956567
- Cryptography and Network Security, by Behrouz A. Forouzan, McGraw-Hill
- Network Security: Private Communication in a Public World, by Kaufman, Perlman, and Speciner, Prentice Hall, 2nd Edition
- Arduino Project Handbook, No Starch Press

- Arduino Project Handbook Vol 2, No Starch Press
- Arduino Playground, No Starch Press
- Raspberry Pi Project Handbook, No Starch Press

Brief list of topics to be covered

- Internet of Things (IoT) concepts
- IoT platforms (e.g., smart thermostat, smartwatch, etc.))
- Software architecture of IoT devices
- Hardware architecture of IoT devices
- Fundamental security services
- Confidentiality, integrity, authentication in IoT
- Access control, non-repudiation, availability in IoT
- Key management in IoT
- Intrusion detection and prevention in IoT
- Malicious software in IoT
- Digital forensics in IoT
- Energy-efficient design principles in IoT
- Privacy-preserving operations in IoT

Grading Scheme

Module Assignments	40%
Midterm	30%
Final Exam	30%
Total	**100%**

Tentative Grading Scheme

Letter	Range%	Letter	Range%	Letter	Range%
A	95 or above	B	83 - 86	C	70 - 76
A-	90 - 94	B-	80 - 82	D	60 - 69
B+	87 - 89	C+	77 - 79	F	59 or less

University's Code of Academic Integrity

Florida International University is a community dedicated to generating and imparting knowledge through excellent teaching and research, the rigorous and respectful exchange of ideas, and community service. All students should respect the right of others to have an equitable opportunity to learn and honestly to demonstrate the quality of their learning. Therefore, all students are expected to adhere to a standard of academic conduct, which demonstrates respect for themselves, their fellow students, and the educational Mission of the University. All students are deemed by the University to understand that if they are found responsible for academic misconduct, they will be subject to the Academic Misconduct procedures and sanctions, as outlined in the Student Handbook. More information can be found at **http://academic.fiu.edu/academic_misconduct.html (http://academic.fiu.edu/academic_misconduct.html)**

Plagiarism

Please note copying and pasting directly from the resources rather than expressing things in your own words is not allowed and is plagiarism. Please check the FIU's note on plagiarism at the following links:

** **http://education.fiu.edu/plagiarism/ (http://education.fiu.edu/plagiarism/)** **http://libguides.fiu.edu/plagiarism (http://libguides.fiu.edu/plagiarism)**

** **http://academic.fiu.edu/academicbudget/misconductweb/1acmisconductproc.htm (http://academic.fiu.edu/academicbudget/misconductweb/1acmisconductproc.htm)**

Department Regulations Concerning Incomplete Grades

To qualify for an Incomplete, a student:

1. Must contact the instructor or the department senior secretary as to the reasons leading to the request of an incomplete grade.
2. Must be passing the course prior to that part of the course that is not completed
3. Must make up the incomplete work through the instructor of the course
4. All missed work must be finished before last two weeks of the following term.

University policies on sexual harassment, and religious holidays, and information on services for students with disabilities, Please visit the following websites: **http://academic.fiu.edu/ (http://academic.fiu.edu/)** ; **http://drc.fiu.edu (http://drc.fiu.edu)**

Course Policies:

- **Academic Misconduct:** For work submitted, it is expected that each student will submit their ov original work. Any evidence of duplication, cheating or plagiarism will result at least a failing grad the course.
- **Excused Absences:** Only emergency medical situations or extenuating circumstances are excused with proper documentation. After reviewing documentation you are required to email a description of the excuse and absence dates as a written record to **suluagac@fiu.edu (mailto:suluagac@fiu.edu)** .
- **Deadlines:** Assignments are due at the beginning of the class period on the date specified. Assignments submitted the next day will receive 75% of the full credit and two days after will receive half (%50) credit.
- To get assistance, students are encouraged to see the TA and/or the course instructor by an appointment.
- Students are encouraged to ask questions and to discuss course topics with the instructor and with each other.
- Any work submitted should display Panther ID number and should be signed, as the students' own work, and that no unauthorized help was obtained.
- Cell phones, communicators, MP3 players, head-sets are not allowed to be used in the class.
- Instructor reserves right to change course materials or dates as necessary and should inform the students if any change is needed.

Exam policy:

1. Make sure to complete the assigned homework in order to do well in the exam.
2. All exams are closed book and closed notes.
3. Use of any electronic device such as cellphones, smart phones, tablets, laptops is not permitted.
4. No discussion is permitted during the exams.
5. Instructor is not compelled to give credit for something he cannot read or follow logically.
6. Cheating is considered as a serious offense. Students who are caught will receive the appropriate consequences.

Notes: The syllabus and timelines are subject to change at the discretion of the Professor. However, if any change occurs, students are given prior notice for the changes.

Mubarak Mujawar, Revision: Monday, January 10, 2022 **Last Update**