

Course Syllabus

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EEL 6935: Cybersecurity Case Studies

Class Periods: Tuesday 3-4:55pm | Thursday 4:05 – 4:55pm

Location: BEN 0328

Academic Term: Spring 2018

Instructor:

Name: Dr. Swarup Bhunia

Email: [swarup@ece.ufl.edu \(mailto:swarup@ece.ufl.edu\)](mailto:swarup@ece.ufl.edu)

Telephone: 352-392-5989

Office Hours: Tuesday 2-3PM or by Appointment

Office Location: MAE 226C (601 Gale Lemerand Dr., Gainesville, FL 32603)

Teaching Assistants:

Fengchao Zhang

Kai Yang

Course Description

The course will cover real-life cyberattacks through a set of case studies and in-depth analysis of these attacks in terms of underlying causes – i.e. vulnerabilities and exploitations; the associated social/political/economical impact; and technical, legal, policy solutions to deal with them. These topics will be covered through a set of students' presentations and guest lectures. The course will be rich in literature survey and reading. Students will be expected to read, analyze, think and talk. They will also be leading discussions and writing reports on various topics on cybersecurity.

Course Pre-Requisites / Co-Requisites

- EEL4930/EEL5934: Intro to Hardware Security and Trust

Course Objectives

This is an upper-level undergraduate and graduate-level course that intends to help students

- Analyze the real cyberattacks of diverse nature over the years and their impact on social and economic aspects. Learn history of cyberattacks.
- Understand how vulnerability across different layers of complex computing and communication systems spanning hardware, software, network layer leads to these attacks.
- Think sophisticatedly about cyberattacks and be able to distinguish between noisy attacks and serious ones.
- Think how secure systems can be developed based on a holistic understanding of

Key Concepts

Practical cyberattacks – examples, vulnerability analysis, and protection approaches. Distributed Denial of Service Attacks, botnets, malware and ransomware. Social and economical aspects of cybersecurity. Passwords and cryptographic protection. Cyberattack attribution and deterrence. Privacy issues and technical/legal/policy solutions. Cyberwar possibilities and prevention. Cybersecurity of critical infrastructure.

Materials and Supply Fees

N/A

Recommended Textbooks and Software

There is no required textbook for the course. The following books serve as reference for concepts explored in this course:

07. James Waldo, Herbert Lin, and Lynette Millett, "Engaging Privacy and Information Technology in a Digital Age", National Academies Press, 2007.
08. William Owens, Kenneth Dam, and Herbert Lin, Technology, Policy, Law, and Ethics Regarding US Acquisition and Use of Cyberattack Capabilities, 2009.
 - Edward Amoroso, "Cyber Attacks: Protecting National Infrastructure", Student Edition, Butterworth-Heinemann, 2012.
14. Aditya Sood and Richard Enbody, "Targeted Cyber Attacks: Multi-staged Attacks Driven by Exploits and Malware", Syngress, 2014.
15. "Cyber Attacks, Attribution, and Deterrence: Case Studies – Stuxnet Attack on Iran, LulzSec, and Estonian Attacks, Protection of Cyberspace and Digital Infrastructure as Vital to National Security", 2017.
16. Tehranipoor and C. Wang (Eds.). "Introduction to Hardware Security and Trust", Springer, ISBN: 978-1-4419-8079-3, 2012.
 - Erickson, Jon. "Hacking: The Art of Exploitation." No Starch Press, San Francisco, 2008. ISBN: 1-59327-144-2.
 - Petzold, Charles. "Code: The Hidden Language of Computer Hardware and Software." Microsoft Press, Redmond, 2000. ISBN: 0-7356-1131-9.

Course Schedule

Week	Date	Topics	Student Seminar / Report
1	1/8-1/12	Introduction to the Course and Student group formation for seminar/report	None
2	1/15-1/20	Guest Lecture: Automotive Security – practical hacks on autonomous vehicles (NXP)	None
3	1/22-1/26	Understanding Mirai IoT botnets & DDoS attacks	
4	1/29-2/02	Understanding Cyberattack and Cyberexploitation Reference: William Owens, Kenneth Dam, and Herbert Lin, Technology, Policy, Law, and Ethics Regarding US Acquisition and Use of Cyberattack Capabilities, 1.1-1.7, Box 1.4 on page 32.	Student Presentation
5	02/05-02/09	Guest Lecture: Network Router Security and FPGA Security (Cisco)	None
6	02/12-02/16	Cyberwar: Instances and What Lies in the Future? Reference: William Owens, Kenneth Dam, and Herbert Lin, Technology, Policy, Law, and Ethics Regarding US Acquisition and Use of Cyberattack Capabilities, 1.8, 2.3.1-2.3.2, and 9.3.	
7	02/19-02/23	David Sanger and Martin Fackler, NSA Breached North Korean Networks Before Sony Attack, Officials Say, New York Times, January 18, 2015.	Student Presentation
8	02/26-03/02	Tracking Attackers: Attribution	Student Presentation
		Cyber Defense and Deterrence	Student Presentation

9	03/05-03/09	SPRING BREAK	
10	03/12-03/16	Ransomware Attacks: A Case Study on WannaCry ransomware attack	Student Presentation
11	03/19-03/23	Guest Lecture: Applied Cryptography and standards (NIST / NSA)	Student Presentation
12	03/26-03/30	Morris Worm, Melissa and ILOVEYOU Virus Sony and Equifax Cyberattack	Student Presentation
13	04/02-04/06	References: M. Cieply, "Sony Cyberattack, First a Nuisance, Swiftly Grew Into a Firestorm", NYT, 2014. T. Bernard, "Equifax Says Cyberattack May Have Affected 143 Million in the U.S.", NYT, 2017.	Student Presentation
14	04/09-04/13	Passwords, Usability, and Identity Management References: Anne Adams and Angela Sasse, The User is not the Enemy, Communications of the ACM, 1999. P. Inglesant and A. Sasse, True Cost of Unusable Password Policies: Password Use in the Wild, Proceedings of the 28th International Conference on Human Factors in Computing Systems, 2010. Joseph Bonneau, Dinei Florencio, Cormac Herley, and Paul Van Orrschot, The Quest to Replace Passwords, IEEE Security and Privacy 2013.	Student Presentation
15	04/16-04/20	Guest Lecture: Cybersecurity of critical infrastructure (NSA) Cybersecurity and The Threats to Privacy: Technical, legal, and Policy Solutions	None
16	04/24-04/25	References: Daniel Solove, Why Privacy Matters Even if You Have Nothing to Hide, Chronicle of Higher Education, May 15, 2011. Robert Gellman, Civil Liberties and Privacy Implications of Policies to Prevent Cyberattacks, Proceedings of a Workshop on Deterring Cyberattacks, 2010.	Report Due

Attendance Policy, Class Expectations, and Make-Up Policy

Make sure you meet the following criteria. These are essential for you to be able to complete this course successfully.

- **Student Seminars** – Students need to be divided in groups (of two) and each group needs a make two presentations. The topics have to be selected from the list (provided in this syllabus) given to them in the beginning of the class. Each seminar will be 40 min long followed by a discussion session.
- **Rapporteur** – Each group of student has to serve as "rapporteur" for one of the student cyberattack presentation. The responsibility as Rapporteur is to lead the discussion after each student presentation. They need to gain enough background knowledge to ask a set of questions and steer the discussion so that issues which require further clarification can be covered.
- **Report Format** – Each student group has to submit a report individually on a real-life cyber-attack. The report is to be completed by computer - handwritten assignments will not be accepted. One report per group. A common report format will be provided to the students. salient issues regarding an attack including nature of attack, attacker and consequence; analyze vulnerabilities and root causes; raise questions and illuminate issues; propose technical, social, or federal measures to be taken to protect against the attack.

Evaluation of Grades

Your course grade is based on your overall performance through the entire semester. The relative weights for the final grade are the following:

- Attendance **15%**
- Seminar 1 **20%**

- Seminar 2 **20%**
- Report **45%**

Grading Policy

Percent	Grade	Grade Points
93.4 - 100	A	4.00
90.0 - 93.3	A-	3.67
86.7 - 89.9	B+	3.33
83.4 - 86.6	B	3.00
80.0 - 83.3	B-	2.67
76.7 - 79.9	C+	2.33
73.4 - 76.6	C	2.00
70.0 - 73.3	C-	1.67
66.7 - 69.9	D+	1.33
63.4 - 66.6	D	1.00
60.0 - 63.3	D-	0.67
0 - 59.9	E	0.00

More information on UF grading policy may be found at: <https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>
<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

Students Requiring Accommodations

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, <https://www.dso.ufl.edu/drc> <https://www.dso.ufl.edu/drc>) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

Course Evaluation

Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at <https://evaluations.ufl.edu/evals> <https://evaluations.ufl.edu/evals>, <https://evaluations.ufl.edu/evals> Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at <https://evaluations.ufl.edu/results/> <https://evaluations.ufl.edu/results/>, <https://evaluations.ufl.edu/results/>

University Honesty Policy

UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor Code (<https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/> <https://www.dso.ufl.edu/sccr/process/student-conduct->

[honor-code/](#)) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

Campus Resources:

Health and Wellness

U Matter, We Care:

If you or a friend is in distress, please contact umatter@ufl.edu (<mailto:umatter@ufl.edu>) or 352 392-1575 so that a team member can reach out to the student.

Counseling and Wellness Center: <http://www.counseling.ufl.edu/cwc> (<http://www.counseling.ufl.edu/cwc>), (<http://www.counseling.ufl.edu/cwc>) and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

Sexual Assault Recovery Services (SARS)

Student Health Care Center, 392-1161.

University Police Department at 392-1111 (or 9-1-1 for emergencies), or <http://www.police.ufl.edu/>. (<http://www.police.ufl.edu/>)

Academic Resources

E-learning technical support, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu. (<mailto:Learning-support@ufl.edu>) <https://lss.at.ufl.edu/help.shtml> (<https://lss.at.ufl.edu/help.shtml>), (<https://lss.at.ufl.edu/help.shtml>)

Career Resource Center, Reitz Union, 392-1601. Career assistance and counseling. <https://www.crc.ufl.edu/> (<https://www.crc.ufl.edu/>), (<https://www.crc.ufl.edu/>)

Library Support, <http://cms.uflib.ufl.edu/ask> (<http://cms.uflib.ufl.edu/ask>), (<http://cms.uflib.ufl.edu/ask>) Various ways to receive assistance with respect to using the libraries or finding resources.

Teaching Center, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring. <https://teachingcenter.ufl.edu/> (<https://teachingcenter.ufl.edu/>), (<https://teachingcenter.ufl.edu/>)

Writing Studio, 302 Tigert Hall, 846-1138. Help brainstorming, formatting, and writing papers. <https://writing.ufl.edu/writing-studio/> (<https://writing.ufl.edu/writing-studio/>), (<https://writing.ufl.edu/writing-studio/>)

Student Complaints Campus: https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf (https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf), (https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf)

On-Line Students Complaints: <http://www.distance.ufl.edu/student-complaint-process> (<http://www.distance.ufl.edu/student-complaint-process>)

Course Summary:

Date	Details
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