

CMSC 413: Introduction to Cyber Security

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Description:

Semester course; 3 lecture hours; 3 credits.

The course will provide an introduction to computer security, cyber-attacks and the basic intrusion detection and defense techniques. Lectures cover topics such as introduction to cyber-attacks, software vulnerabilities, vulnerability exploitation, malware, cryptography fundamental, password security, network security, intrusion detection, firewall, and forensics. There will be five assignments, one project and several quizzes other than mid-term and final exam.

Course Goals:

Students will learn how the basic knowledge about computer security, basic cyber-attack skills and corresponding detection and defense techniques. After the semester students are expected to have an in-depth understanding of the root cause of cyber-attacks, know how to exploit a simple vulnerable service, know how to secure a service, and configure firewall rules, etc. Students should also master basic forensic skills and know how to protect their computers and servers from cyber-attacks. Student will also

learn basic cyber ethics to be able to distinguish legitimate behaviors from criminal behaviors.

Tentative Course Topics:

Lecture topics include introduction of computer security, cyber-attacks, vulnerabilities and exploitation, malware, fundamental crypto, intrusion detection systems, firewalls, password security, forensics, and cyber-ethics, etc.

ABET Criteria Addressed:

2. Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
3. Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.
4. Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.

Prerequisites:

CMSC401

Text Book:

Computer Security: Principles and Practice

by William Stallings; Lawrie Brown;

Publisher: Pearson

Print ISBN: 9780134794105, 0134794109

eText ISBN: 9780134794181, 0134794184

Edition: 4th

Copyright year: 2018

The following are some recommended reference books:

William Easttom, *Network Defense and Countermeasures: Principles and Practices*, 2nd Edition. Pearson IT Certification, 2014

Charles P. Pfleeger; Shari Lawrence Pfleeger, *Analyzing Computer Security: A Threat/Vulnerability/Countermeasure Approach*. Prentice Hall Publish

Grading:

A: 90% - 100%

B: 80% - 90%

C: 70% - 80%

D: 60% - 70%

F: under 60%

Assignments:

There will be five assignments during the semester. Each assignment contributes to 5% of the final grade. The purpose of the assignments is to help students understand the course material at a deeper level through practice hands-on skills and research on recent progress on cyber security technology.

Quizzes or In-class challenges:

There will be random in-class quizzes or in-class challenges to test the knowledge that student learned in classes and the ability to have effective collaboration as a team member. Each quiz and in-class challenges will contribute to 1-2% of the final grade.

Labs:

There will be a number of in-class labs. The purpose of the labs is to allow students to practice some hands-on cyber attack and defense skills. During each lab, students are required to accomplish certain tasks to earn credits for the lab. Lab tasks have to be done independently. Each lab contributes 2% of the final grade of this course.

Schedule and Important Dates (Tentative):

	Date	Topic	Comments
Week 1	Aug 25	Information Class (First class)	Prerequisite test
Week 2	Aug 30	Introduction	Assignment 1 is out
	Sep 1	Cryptography I	
Week 3	Sep 6	(No class)	Last day to drop (Links to an external site.) a course
	Sep 8	Cryptography II	
Week 4	Sep 13	Vulnerabilities & Exploitations I	Assignment 1 is due
	Sep 15	Vulnerabilities & Exploitations II	Assignment 2 is out
Week 5	Sep 20	Vulnerabilities & Exploitations III	
	Sep 22	Vulnerabilities & Exploitations IV	
Week 6	Sep 17	Lab Practice 1 (Web Security)	
	Sep 29	Malware I	Assignment 2 due
Week 7	Oct 4	Malware II	Assignment 3 is out
	Oct 6	Malware III	

Week 8	Oct 11	Lab Practice 2 (Malware)	Course project topic announced
	Oct 13	Network Security I	
Week 9	Oct 18	Network Security II	
	Oct 20	Lab Practice 3 (Network security)	
Week 10	Oct 25	Midterm Exam	
	Oct 27	DDoS	Assignment 3 due Midterm grades due
Week 11	Nov 1	Cyber Ethics	Assignment 4 out
	Nov 3	Access Control	
Week 12	Nov 8	Authentication	
	Nov 10	Lab Practice 4 (Password security)	
Week 13	Nov 15	Firewall I	Assignment 4 due
	Nov 17	Firewall II	Assignment 5 out
	Nov 22	Fall break - No class	

Week 14	Nov 24	Fall break - No class	
Week 15	Nov 29	Lab Practice 5 (Firewall)	Assignment 5 due
	Dec 1	Wireless Security	
Week 16	Dec 6	Hot Topics in Cyber Security (Last class) Final Exam Info	
	Dec 8	Final Exam for CMSC413	
Week 17	Dec 13	Final Exam Week	
	Dec 15		Course project due
Week 18	Dec 22		Final grades due

Student Code of Conduct:

The Office of Student Conduct and Academic Integrity is committed to cultivating an atmosphere of civility and respect among our students; this will in turn foster an environment conducive to academic success and personal development.

Under the terms of the Virginia Commonwealth University Student Code of Conduct students are extended rights, but also assume many responsibilities. For a student to succeed at VCU, they must know and understand this policy, and live within the parameters of the Student Code of Conduct and other the other university policies.

Each student shall be responsible for his/her conduct from the time of application for admission through the actual awarding of their degree (and even if conduct is not discovered until after a degree is awarded). The Student Code of Conduct shall apply to

student conduct even if the student withdraws from school while a disciplinary matter is pending.

VCU Creed: Philosophy for a University Community:

Academic institutions exist, among other reasons, to discover, advance and transmit knowledge and to develop in their students, faculty and staff the capacity for creative and critical thought. At Virginia Commonwealth University, members of the community should strive to exemplify the following specific ideals in addition to other worthy ideals:

- To demonstrate academic and personal integrity.
- To respect the rights and property of others.
- To be open to others' opinions.
- To uphold academic freedom and freedom of intellectual inquiry.
- To appreciate diversity and to value and learn from the uniqueness of each person.
- To uphold the right of all persons to be treated with dignity and respect and to refrain from all forms of intimidation, harassment and illegal discrimination.
- To demonstrate and respect intellectual courage in situations that demand it.

Students are required to engage in responsible social conduct that reflects credit upon the University community and to model good citizenship in any community.