CS/ECE 5584: Network Security

Fall 2017

Instructor:	Ning Zhang	**Time:**	M 16:00 – 18:45
Email:	ningzh@vt.edu	**Place:**	NVC 323 / Torgersen Hall 1100C
Website:	https://networksecurityvt.github.io		
Slack:	https://networksecurityvt.slack.com		

Course Description: This course covers principles and techniques in network security. We will discuss various attacks on computer network and how to defend against them. The course consists of three main parts, preliminaries, security in protocols and security in applications, which build on top of one another. Topics include basic cryptography, IPSec, SSL/TLS, HTTPS, user authentication, public key infrastructure, denial of service, network fingerprinting, network malware and anonymous communication. Besides theoretical introductions in lectures, tools used in the security industry will also be discussed and used. Course project will allow students to take a deep dive into a topic in network security. This course is intended for upper-level undergraduate and first-year graduate student.

Prerequisites: This course requires an understanding of computer networks and a basic understanding programming languages. Students without this background are still welcome to take the class, but it will be up to the individual to prepare the nccessary background.

Office Hours: After class or by appointment.

Textbook: There is no textbook for the class. Instead, we will use research papers posted on the course syllabus page page for every lecture. However, the following reference can be helpful.

- Charlie Kaufman, Radia Perlman, and Mike Speciner, *Network Security: Private Communication in a Public World (2nd Edition)*, May 2, 2012

Assignments:

- There are two homework assignments, one class presentation and one class project.

- Students can collaborate on homework assignments, however the write-up of the solution has to be completed individually.

- The class presentation is a 20 minuates discussion on any topic in network security. It can be a particular research work or a survey of a field.

- The class project can be original research or survey on an existing topic in network security. Class project report should follow the IEEE conference template. The length of survey should be around 8 to 10 pages. The class project can also be improvement on an existing security tool. The development should be source controlled using tools, such as git. Students are expected to spend at least several hours on the class project every week.

Grading: Homework (20% = 2 * 10%), Presentation (10%), Project (70%).

Class Policy: Class attendance and participation is essential and expected.

Academic Honesty: Students are expected to follow the Virginia Tech Honor Pledge. The pledge states: "I have neither given nor received unauthorized assistance on this assignment."

Computer Ethics: With greater power, comes greater responsibility. In this course, we will be learning about and exploring some vulnerabilities that could be used to attack systems. Students are expected to behave responsibly and ethically. You may not attack any system prior approval of the site owners, and may not use anything you learn in this class to disrupt services or harm others. If you have any doubts about whether or not something you want to do is ethical and legal, you should check with the course instructor.

Tentative Course Outline:

Weeks	Topics
08.28.17	Class Introduction and Logistics
	Security Fundamentals - Threat Model and Security Objectives
09.04.17	Labor Day - No Class
09.11.17	Cryptography Review - Symmetric Key Cryptography
09.18.17	Cryptography Review - Asymmetric Key Cryptography
	Class Project Proposal
09.25.17	User Authentication
10.02.17	IPSec
10.09.17	No Class, Project Individual Meeting
10.16.17	SSL/TLS
10.23.17	Public Key Infrastructures, HTTPS and E-mail
	Class Project Progress Report
10.30.17	Wireless security
11.06.17	Network Fingerprinting, Firewalls and Network Intrusion Detection
11.13.17	Denial of Service
11.27.17	Network Malware - Bots and Worms
12.04.17	Anonymous Communication and Anti-Censorship
12.11.17	*Class Project Presentation*
12.20.17	*Class Project Writeup Due*