

CARNEGIE MELLON UNIVERSITY Heinz College

95-758 Network and Internet Security-Z

Fall 2024

Syllabus

Instructor/Course Support

Robert Beveridge: rbeverid@andrew.cmu.edu

Office Hours and Location: By request

Teaching Assistant: TBD

Please include both the instructor and the TA when emailing to get the fastest response.

Textbook (Optional)

Corporate Computer Security, 5th Ed. (Boyle and Panko) ISBN-13: 978-0135823248

<https://www.pearson.com/us/higher-education/program/Boyle-Pearson-e-Text-for-Corporate-Computer-Security-Access-Card-5th-Edition/PGM2616248.html>

Course Description:

- There are two options: in-person in the Spring, online in the Fall.
- 12 units
- TA will also have office hours setup.

This course emphasizes practical employment of network security.

Topics in this course include:

- A working knowledge for the need to design networks
 - Properly support an organization
 - Properly accommodate networking protocols
 - Properly security an organization's cyber assets through its network infrastructure

Learning Objectives:

1. Application of security principles to computer networking
2. The OSI and TCP/IP models of network communications
3. Network security at different layers of the OSI and TCP/IP models
4. Enterprise systems for AAA
5. Security virtual machine and cloud-based IT infrastructure
6. Designing networks on selected protocols to support business operations while maintaining identified levels of network security
7. Supporting secondary network connectivity (wireless, VPNs, BYOD devices, partner networks, cross-domain and other connectivity types)

8. Designing networks to support Resiliency Management, Business Continuity, Disaster Recovery and other principles to avoid network failures that negatively impact the organizations ability to deliver on its core mission.
9. Methods to prevent, detect and respond to security breaches.

Prerequisites

Required: successful completion of Introduction to Information Security Management (95-752) or equivalent experience in industry.

Additional: There is an expectation that students have a general knowledge of IT principles and cybersecurity topics

Adherence to Heinz Laptop requirements: https://www.heinz.cmu.edu/heinz-shared/_files/img/heinz-computing-services-pages/laptop-program-guidelines.pdf

Course Management

All course materials will be managed through Canvas (www.cmu.edu/canvas). Canvas will be used to post announcements of assignments and other information. Check frequently to ensure you have the latest information about the course.

Topical readings that support the course lectures may be added. These readings will be posted under the course schedule portion of the syllabus. *Students are expected to read the material as part of the course materials.* In some cases, these readings will be integrated to homework assignments.

Course Updates and Changes

This syllabus represents the course plan as conceived at the beginning of the semester *but is subject to change and modification by the instructor at any time.* Advanced notice will be provided to students through Blackboard announcements, and when necessary, an updated syllabus will be issued.

External Resources and course videos

Cisco Networking Academy online courses

Cisco Networking Academy self-paced materials will be provided as part of the course. The Academy courses will cover two different subjects: an introductory course in networking technologies to teach networking skills, and a course in Cybersecurity Operations used for some assignments.

VMWare (Fusion pro for Mac or workstation pro for windows) and VirtualBox

This course requires knowledge of installing VMWare and VirtualBox. Students should have at least 50GB of available storage and a recommended 16Gb of memory to run these labs.. VMWare is provided at no cost through CMU. VirtualBox is open source. It is up to the student to notify the instructor at the beginning of the semester if they don't have the appropriate resources to run the labs on their laptop.

If you have a Mac with M2/M3 proc – you will NEED to find an intel-based system to use for labs. Mac's with Intel processors or windows laptops only

Assignment Submissions

Assignments will be posted in Canvas. Students are expected to turn in professionally written and easy to follow documents that is clear and concise which meets the objectives of the assignment. This includes things like properly formatted title page, appropriate references, relevant screenshots with sufficient amount of labeling or explanations, etc. Poorly organized documents will result in point deductions.

Group projects will require ALL students in the group to contribute to the assignment.

Late Submissions

Homework is due at 11:59 PM EST on the assigned due date unless otherwise changed by the instructor. Penalty for late submissions will result in a 25% reduction in grade per day after the due date. Assignments more than 4 days late will not be accepted. See the instructor (in advance if possible) to request exceptions. Extensions on assignments will not be granted unless there are extenuating circumstances.

Attendance Policy

Unless directed by the university, this course is held in-person in the spring and online in the Fall. Students are expected to attend class in all cases unless excused by the instructor. Students need to manage their time appropriately to accomplish all assignments.

Classroom Etiquette

This is a Masters level course taught as part of a professional degree program. Accordingly, you are expected to conduct yourself in a professional manner during the course, and not engage in behavior in the class that would be considered unacceptable in the workplace. This includes appropriate online etiquette in chat sessions or in correspondence with other students. If you have a question about the content of the lecture, please direct it to me or the Teaching Assistant. That way, you have a better chance of getting a prompt response. We will all use 'reply all' so that we all stay 'in the loop' on student correspondence.

Policy on Cheating and Plagiarism

For any assignment found to be the partial or complete result of cheating or plagiarism, your grade for that assignment will be zero. Cheating is defined as inappropriate collaboration among students on an assignment or failure to cite others' work used in the submissions, evaluation materials or presentations. This can include copying someone else's work with or without alteration. When students are found to be collaborating in this way, ALL COLLABORATORS will pay the penalty regardless of who originated the work. Please refer to the University's policies here: <http://www.cmu.edu/policies/StudentPolicy.html>

Course Grading and Rubric

Discussions (20%) – Must be thoughtful and concise. Every student needs to participate and contribute. Answers like "I agree" or answers that provide no value will result in point deduction.

Quizzes (10%) –They are worth 10 points each.

The Assignments (30%) – require disk space (50GB or more in some instances)

You also need to be familiar with VMWARE or Virtual Box.

If you have a Mac with M2/M3 proc – you will NEED to find an intel-based system to use for labs.

Midterm (20%) – Project will require applying all knowledge gained thus far.

Final Project (20%) – Project will require applying all knowledge gained throughout the semester. Due week 14.

Grading Rubric Letter	Interpretation	Point Totals	GPA
A+	Exceptional	96.6 – 100	4.33
A	Excellent	93.3 – 96.5	4.00
A-	Very Good	90.0 – 93.2	3.67
B+	Good	86.6 – 89.9	3.33
B	Acceptable	83.3 – 86.5	3.00
B-	Fair	80.0 – 83.2	2.67
C+	Poor	76.6 – 79.0	2.33
C	Very Poor	73.3 – 76.5	2.00
C -	Minimal Passing	70.0 – 73.2	1.67
D	Failing	Below 70	0

Proposed Schedule - Subject to Change

Week	Date	Topic	Assignments
1	Aug 25	Risk and OSI model	<ul style="list-style-type: none"> ● Cyber Threat Challenge ● Cisco Intro Networking Pt1 ● Cyber Threat Quiz ● Boyle-Chapter 1 ● Systems test
2	Sep 1	Networking Protocols and Security	<ul style="list-style-type: none"> ● OSI-Challenge ● OSI Quiz ● Cisco Intro Networking Pt2
3	Sep 8	Designing Network with IP and VLANS	<ul style="list-style-type: none"> ● VLAN Challenge ● TCP Challenge ● VLAN Quiz ● TCP Quiz ● Cisco – Intro to Networking PT3 ● VLANS and IP addressing
4	Sep 15	Network Design	<ul style="list-style-type: none"> ● Cisco – Intro to Networking Pt4

			<ul style="list-style-type: none"> ● Assignment 1: Intro to Packet Tracer and Network Design ● Packet Tracer ● Router on a Stick – extra credit
5	Sep 22	Secure Networks	<ul style="list-style-type: none"> ● Boyle Ch 4 ● Assignment 2: Cisco - Packet Tracer - Identify Network Flow ● Secure Networks Challenge ● Secure Networks Quiz ● Discussion – Electrical Grid Vulnerability
6	Sep29	Access Controls	<ul style="list-style-type: none"> ● Boyle ch 5 ● Active Directory ● Discussion – Ethics of biometric ● Access challenge ● Access quiz
7	Oct 6	Access Controls and Firewalls	<ul style="list-style-type: none"> ● Discussion – The effectiveness of Firewalls ● Firewall Challenge ● Firewall Quiz ● Midterm
8	Oct 13	No Class	<ul style="list-style-type: none"> ● Fall Break
9	Oct 20	Operating Systems security	<ul style="list-style-type: none"> ● Boyle – Operating Systems ● Assignment 4 – Snort and firewall rules ● Discussion – Costliest breaches ● OS challenge ● OS Quiz
10	Oct 27	Virtualization	<ul style="list-style-type: none"> ● Assignment 5 – Cisco -Setup a Multi-VM environment ● Virtualization quiz ● Virtualization Challenge
11	Nov 3	LINUX	<ul style="list-style-type: none"> ● LINUX Challenge ● Assignment 6: Cisco – Linux Servers ● Assignment 7 – Cisco – Getting familiar with the Linux Shell ● Network Design Assignment
12	Nov 10	Wireless Security	<ul style="list-style-type: none"> ● Wireless Challenge ● Discussion – 5G – Wireless ● Wireless challenge ● Wireless Quiz ● Assignment 8 – Wireless troubleshooting ● Network Design Assignment DUE

13	Nov 17	Application Security	<ul style="list-style-type: none">● Application Security Challenge● Boyle CH 8
14	Nov 24	VPN and Business Continuity	<ul style="list-style-type: none">● Assignment 9 – Create VPN using the CLI● Final Project workshop● VPN Challenge● VPN Quiz● Final Project assignment
15	Dec 1	Final Project	<ul style="list-style-type: none">● Final Project Work