

# CARNEGIE MELLON UNIVERSITY Heinz College

95-758 Network and Internet Security

Spring 2024

Syllabus

---

## Instructor/Course Support

Robert Beveridge: [rbeverid@andrew.cmu.edu](mailto: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

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

### **Course Management**

All course materials will be managed through Canvas ([www.cmu.edu/canvas](http://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. Student should have at least 50GB of available storage and a recommended of 16Gb of memory to run these labs. **Mac's with Intel processors or windows laptops only.** VMWare is provided at no cost through CMU. VirtualBox is opensource. 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.

### **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 Master's 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 (60 pts) – 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.
- Challenges/Quizzes (10 Pts) – These are meant to be fun learning activities.
- Assignments (25 – 75 pts) – Cisco – Intro to Networking, 4 parts. labs require disk space (50GB or more in some instances)
- Midterm–Project will require applying all knowledge gained thus far.

- Final Project (100 pts) –Project will require applying all knowledge gained throughout the semester. This will be a group project.

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	Jan 16	Risk and OSI model	<ul style="list-style-type: none"> <li>• Self-led Cyber Threat Challenge</li> <li>• Cisco Intro Networking Pt1</li> <li>• Cyber Threat Quiz</li> <li>• Boyle-Chapter 1</li> </ul>
2	Jan 23	Networking Protocols and Security	<ul style="list-style-type: none"> <li>• OSI-Challenge</li> <li>• OSI Quiz</li> <li>• Cisco Intro Networking Pt2</li> </ul>
3	Jan 30	Designing Network with IP and VLANS	<ul style="list-style-type: none"> <li>• VLAN Challenge</li> <li>• TCP Challenge</li> <li>• VLAN Quiz</li> <li>• TCP Quiz</li> <li>• Cisco – Intro to Networking PT3</li> <li>• VLANS and IP addressing</li> <li>• Router on a Stick – extra credit</li> </ul>
4	Feb 6	Network Design	<ul style="list-style-type: none"> <li>• Cisco – Intro to Networking Pt4</li> <li>• Assignment 1: Intro to Packet Tracer and Network Design</li> <li>• Packet Tracer</li> </ul>
5	Feb 13	Secure Networks	<ul style="list-style-type: none"> <li>• Boyle Ch 4</li> <li>• Assignment 2: Cisco - Packet Tracer - Identify Network Flow</li> <li>• Secure Networks Challenge</li> </ul>

			<ul style="list-style-type: none"> <li>• Secure Networks Quiz</li> <li>• Discussion – Electrical Grid Vulnerability</li> </ul>
6	Feb 20	Access Controls	<ul style="list-style-type: none"> <li>• Boyle ch 5</li> <li>• Active Directory</li> <li>• Discussion – Ethics of biometric</li> <li>• Access challenge</li> <li>• Access quiz</li> </ul>
7	Feb 27	Access Controls and Firewalls	<ul style="list-style-type: none"> <li>• Discussion – The effectiveness of Firewalls</li> <li>• Firewall Challenge</li> <li>• Firewall Quiz</li> </ul>
8	Mar 5	No Class	<ul style="list-style-type: none"> <li>• Spring Break</li> </ul>
9	Mar 12	Operating Systems security	<ul style="list-style-type: none"> <li>• Boyle – Operating Systems</li> <li>• Assignment 5 – Snort and firewall rules</li> <li>• Discussion – Most costliest breaches</li> <li>• OS challenge</li> <li>• OS Quiz</li> </ul>
10	Mar 19	Virtualization	<ul style="list-style-type: none"> <li>• Assignment 4 – Cisco -Setup a Multi-VM environment</li> <li>• Virtualization quiz</li> <li>• Virtualization Challenge</li> </ul>
11	Mar 26	LINUX	<ul style="list-style-type: none"> <li>• LINUX Challenge</li> <li>• Assignment 6: Cisco – Linux Servers</li> <li>• Assignment 7 – Cisco – Getting familiar with the Linux Shell</li> <li>• Network Design Assignment</li> </ul>
12	Apr 2	Wireless Security	<ul style="list-style-type: none"> <li>• Wireless Challenge</li> <li>• Discussion – 5G – Wireless</li> <li>• Wireless challenge</li> <li>• Wireless Quiz</li> <li>• Assignment 8 – Wireless troubleshooting</li> <li>• Network Design Assignment DUE</li> </ul>
13	Apr 9	Application Security	<ul style="list-style-type: none"> <li>• Application Security Challenge</li> <li>• Boyle CH 8</li> <li>• Final Project assignment – Group project</li> </ul>
14	Apr 16	VPN and Business Continuity	<ul style="list-style-type: none"> <li>• Assignment 9 – Create VPN using the CLI</li> <li>• Final Project workshop</li> <li>• VPN Challenge</li> <li>• VPN Quiz</li> </ul>
15	Apr 23	Final Project	<ul style="list-style-type: none"> <li>• Final Project DUE</li> </ul>

