

ECE567: Advanced Network Security

Course Dates

CRN(s):	Section A01 CRN: 20997 Section A02 CRN: 20998
Term:	Spring 2022
Course Start:	2022-01-10
Course End:	2022-04-29
Withdrawal with 100% reduction of tuition fees:	2022-01-23
Withdrawal with 50% reduction of tuition fees:	2022-02-13
Last day for withdrawal (no fees returned):	2022-02-28

Scheduled Meeting Times (M=Mon, T=Tue, W=Wed, R=Thu, F=Fri)

Section:	Location:	Classes Start:	Classes End:	Days of week:	Hours of day:	Instructor:
A01	ECS 104	2022-01-10	2022-04-07	MR	08:30-09:50	Issa Traore
A02	ECS 104	2022-01-10	2022-04-07	MR	08:30-09:50	Issa Traore

Instructor(s)

Name: **Issa Traore**
 Office: EOW 415
 Phone: (250) 721-8697
 Email: itraore at ece dot uvic dot ca

Office Hours: Comments
 Mon 11:00am-12:00pm Office hours will be online. Zoom link will be provided in Brightspace.
 Thu 11:00am-12:00pm

Course Objectives

The purpose of the course is to introduce fundamental concepts and techniques underlying the science and art of network security, with a primary focus on network security vulnerability assessment and penetration testing, secure network architecture design, and network security services and mechanisms. Examples of attack techniques and tools are introduced, as well as adequate countermeasures against these attacks.

Learning Outcomes

By the end of this course, students should have a good grasp of network vulnerability assessment techniques, as well as secure architecture design and countermeasure. They should be able to identify for a target network the security requirements, extract adequate security policy, and design and implement appropriate protection strategies and countermeasures. They should become proficient in how to conduct penetration testing for an existing enterprise network and develop and implement adequate remediation plan.

Syllabus

Unit 1: Network Security Overview

- Ethical issues
- Introduction of fundamental security principles and concepts

- Basic Network Protocols and Addressing Schemes

Unit 2: Network Attacks and Penetration Testing

- Review of attack methods and tools
- Generic penetration testing methodology
- Authentication Systems and Protocols
- Port scanning, denial of service, attack on authentication system, privilege escalation attacks, etc.

Unit 3: Web Applications Attacks

Web application vulnerabilities and attacks; the following attack methods will be covered:

- Code injection
- SQL injection
- Cross-Site Scripting
- Directory traversal
- Web DOS

Unit 4: Malicious Software

- Trojan horses
- Rootkits
- Viruses
- Worms
- Botnets
- Exploit Kits (EKs)
- Ransomware

Unit 5: Security Policies

- Notions and examples of security policies and models: Bell-LaPadulla, Biba, Chinese Wall etc.
- Basic access control model, reference monitor concept, security kernel.
- Role-based access control model.

Unit 6: Firewall Systems

- Classes of firewall
- Firewall configurations and architectures
- Network Address Translation (NAT)
- Linux IP Tables

Unit 7: Intrusion Detection Systems (IDS)

- IDS models, architectures, and tools
- Intrusion Prevention Systems (IPS)
- IDS/IPS performance metrics and evaluation

Unit 8: Virtual Private Network (VPN)

- Network Layer Security
- IPSec protocol
- VPN Technology
- Secure Network Architecture

Unit 9: Biometrics Systems

- Biometric system components
- Biometric performance metrics and evaluation techniques
- Technologies overview: fingerprint, face, gait, keystroke dynamic, etc.

Textbook

Required Text	Optional Text
Title: The Basics of Hacking and Penetration Testing - Ethical Hacking and Penetration Testing Made Easy	Title: Computer Network Security

Required Text	Optional Text
Author: Patrick Engebretson	Author: Jie Wang
Publisher/Year: Syngress, August 2013	Publisher/Year: Springer, 2009
eBook ISBN: 9780124116412	Note: available as ebook in Uvic Library Online
Paperback ISBN: 9780124116412	n/a

Reference Materials

1. "Computer Security - Art and Sciences". Matt Bishop, 2nd edition, Pearson, 2019
2. "Network Security, Firewalls, and VPNs". J. Michael Stewart. Jones & Bartlett Learning; 2nd edition, 2014.
3. Lectures Notes available on course site

Assessment

Assessment Tool	Weight	Date
Assignment	15%	Due: February 13, 2022
Project - Part 1	25%	Due: March 7, 2022
Project - Part 2	20%	Due: April 7, 2022
Mid-term	40%	March 24, 2022

Notes

Note:

The final grade obtained from the above marking scheme for the purpose of GPA calculation will be based on the percentage-to-grade point conversion table as listed in the current Graduate Calendar.

<https://www.uvic.ca/calendar/archives/202101/grad/index.php#/policy/B13jeiMdE?bc=true&bcCurrent=07%20-%20Grading&bcltemType=policies>

General Information

Note to Students:

Students who have issues with the conduct of the course should discuss them with the instructor first. If these discussions do not resolve the issue, then students should feel free to contact the Chair of the Department by email or the Chair's Secretary to set up an appointment.

Accommodation of Religious Observance:

<https://www.uvic.ca/calendar/archives/202109/grad/#/policy/SkmigiMOV>

Policy on Inclusivity and Diversity:

Engineering: <https://www.uvic.ca/engineering/about/equity/index.php>

Academic Calendar: [https://www.uvic.ca/calendar/archives/202109/grad/#/policy/HkQQpzdAN?](https://www.uvic.ca/calendar/archives/202109/grad/#/policy/HkQQpzdAN?bc=true&bcCurrent=General%20University%20Policies&bcGroup=%20General%20University%20Policies&bcltemType=policies)

[bc=true&bcCurrent=General%20University%20Policies&bcGroup=%20General%20University%20Policies&bcltemType=policies](https://www.uvic.ca/calendar/archives/202109/grad/#/policy/HkQQpzdAN?bc=true&bcCurrent=General%20University%20Policies&bcGroup=%20General%20University%20Policies&bcltemType=policies)

Standards of Professional Behaviour:

You are advised to read the Faculty of Engineering document Standards for Professional Behaviour, which contains important information regarding conduct in courses, labs, and in the general use of facilities.

<http://www.uvic.ca/engineering/assets/docs/professional-behaviour.pdf>

Academic Integrity:

Cheating, plagiarism and other forms of academic fraud are taken very seriously by both the University and the Department. You should consult the entry in the current Graduate Calendar for the UVic policy on academic integrity.

https://www.uvic.ca/calendar/archives/202109/grad/#/policy/BJujesM_E

Equality:

This course aims to provide equal opportunities and access for all students to enjoy the benefits and privileges of the class and its curriculum and to meet the syllabus requirements. Reasonable and appropriate accommodation will be made available to students with documented disabilities (physical, mental, learning) in order to give them the opportunity to successfully meet the essential requirements of the course. The accommodation will not alter academic

standards or learning outcomes, although the student may be allowed to demonstrate knowledge and skills in a different way. It is not necessary for you to reveal your disability and/or confidential medical information to the course instructor. If you believe that you may require accommodation, the course instructor can provide you with information about confidential resources on campus that can assist you in arranging for appropriate accommodation. Alternatively, you may want to contact the Centre for Accessible Learning located in the Campus Services Building: <https://www.uvic.ca/services/cal/>. The University of Victoria is committed to promoting, providing, and protecting a positive, and supportive and safe learning and working environment for all its members.

Course Lecture Notes:

Unless otherwise noted, all course materials supplied to students in this course have been prepared by the instructor and are intended for use in this course only. These materials are NOT to be re-circulated digitally, whether by email or by uploading or copying to websites, or to others not enrolled in this course. Violation of this policy may in some cases constitute a breach of academic integrity as defined in the UVic Calendar.

Sexualized Violence Prevention and Response at UVic:

UVic takes sexualized violence seriously, and has raised the bar for what is considered acceptable behaviour. We encourage students to learn more about how the university defines sexualized violence and its overall approach by visiting www.uvic.ca/svp. If you or someone you know has been impacted by sexualized violence and needs information, advice, and/or support, please contact the sexualized violence resource office in Equity and Human Rights (EQHR). Whether or not you have been directly impacted, if you want to take part in the important prevention work taking place on campus, you can also reach out:

Where: Sexualized violence resource office in EQHR; Sedgewick C119

Phone: 250.721.8021

Email: svpcoordinator@uvic.ca

Web: www.uvic.ca/svp

Office of the Ombudsperson:

The Office of the Ombudsperson is an independent and impartial resource to assist with the fair resolution of student issues. A confidential consultation can help you understand your rights and responsibilities. The Ombudsperson can also clarify information, help navigate procedures, assist with problem-solving, facilitate communication, provide feedback on an appeal, investigate and make recommendations. Phone: 250-721-8357; Email: ombuddy@uvic.ca, Website: <https://uvicombudsperson.ca/>