



### **ELEC 567 – Advanced Network Security**

**Term – SPRING 2016 (201601)**

#### **Instructor**

Dr. Issa Traore  
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#### **Office Hours**

Days: Monday, Thursday  
Time: 10:00am-12:00  
Location: EOW 415

#### **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.

#### **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, and input validation 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
- Cross-site request forgery
- Directory traversal

#### *Unit 4: Malicious Software*

- Trojan horses
- Rootkits
- Viruses
- Worms
- Botnets
- Man-in-the-Browser (MITB)

#### *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.

### *Unit 10: Wireless Network Security*

- Wireless communications and 802.11 WLAN standards
- Common wireless attacks
- Wireless defense mechanisms

**A-Section(s):** A01 / CRN 21191                      B01    N/A                      TA (email)                      N/A  
                         A02 / CRN 21192  
**Days:** Monday, Thursday  
**Time:** 8:30-9:50 am  
**Location:** ECS 108

#### **Required Text**

**Title:** Computer Network Security  
**Author:** Jie Wang  
**Publisher:** Springer (available online as eBook)  
**Year:** 2009

#### **Optional Text**

**Title:**  
**Author:**  
**Publisher:**  
**Year:**

#### **References:**

1. "Computer Security – Art and Sciences". Matt Bishop, Addison Wesley, 2002
2. "Hacking Exposed-Computer Forensics: Secrets and Solutions". Aaron Philipp, David Cowen, Chris Davis. McGraw Hill Professionals, ISBN: 0072256753, 2005
3. "Network Security, Firewalls, and VPNs". J. Michael Stewart. Jones & Bartlett Learning; 2<sup>nd</sup> edition, 2014.
4. Lectures Notes available on Moodle

#### **Assessment:**

Assignments #1:	10%	Due Dates: January 28, 2016
Assignment #2:	10%	February 11, 2016
Project – Part 1:	25%	March 3, 2016
Project – Part2:	15%	April 4, 2016
Mid-term (N/A)		
Final Exam:	35%	Date: TBD
Attendance and Participation:	5%	

#### **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.

<http://web.uvic.ca/calendar/GRAD/FARe/Grad.html>

#### **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**

<http://web.uvic.ca/calendar/GI/GUPo.html>

#### **Policy on Inclusivity and Diversity**

<http://web.uvic.ca/calendar/GI/GUPo.html>

#### **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>

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.

<http://web.uvic.ca/calendar/FACS/UnIn/UARe/PoAcl.html>

#### **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.

#### **Course Experience Survey (CES)**

Towards the end of term, as in all other courses at UVic, you will have the opportunity to complete an anonymous survey regarding your learning experience (CES). The survey is vital to providing feedback to me regarding the course and my teaching, as well as to help the department improve the overall program for students in the future. When it is time for you to complete the survey you will receive an email inviting you to do so. You will need to use your UVic netlink ID to access the survey, which can be done on your laptop, tablet, or mobile device. I will remind you and provide you with more detailed information nearer the time but please be thinking about this important activity during the course.