CYBER DEFENCE
CHALLENGE

# NETWORKING & CYBER SECURITY GRADE 12

**Curriculum**

This document can be used as a high level guide to prepare Canadian Cyber Defence Challenge (CCDC) participants for the competition. Most of the information will be presented to the participants in very compressed manner. Hence, it is expected from the participants to be engaged in self-study activities based on the presented information. The links below provide helpful references and serve as an additional level of support to the fundamentals that are presented in the curriculum framework.

**Curriculum development approach:**

- Analysis of the existing IT security related Manitoba high school curriculum.
- Analysis of publicly available information from Cyber Patriots and Cisco academy training courses.
- Incorporation of the best security industries practices.
- Alignment with CCDC competition.

**Delivery:**

Three 2-3 hours sessions scheduled form a beginning of a school year to the competition date.

**Support Document(s):**

Please refer to the teaching curriculum <Networking & Cyber Security Grade 12 Curriculum Framework> for information about essential requirements. The curriculum framework is broken into five key areas:

1. Advanced Operating Systems
2. Advanced Networking Technologies
3. Server Administration
4. CCDC Value Add-on
5. Applied Networking and Cyber Security

For each of the five areas, the learning topics have been color coded to represent the teaching/learning level of maturity:

**Basic level**

**Advanced Level**

**Advanced (Plus) Level**

Please note that it is not a requirement to have to complete one level (i.e. Basic Level) before advancing to the next level (i.e. Advanced Level).

The curriculum is a guide and as such can be modified accordingly to the teaching and learning styles of the instructors and the students.

In addition to the instructional curriculum, the CCDC has provided their own professional advice with a section titled "CCDC Value Add-on". This section provides a list of additional information resources and learning outcomes that may assist schools to prepare their students for the challenge event. At a minimum, if a school has never participated in the challenge, it is recommended that students be exposed to these topics - so that they can learn and participate at the actual game day event.

If schools have any questions regarding this material, they contact the CCDC as per the contact information on the website. The CCDC is committed to ensuring that schools and students feel comfortable to engage in the event. However, master of these topics is not necessary to participate. Ultimately, the challenge event itself serves as the greatest teaching tool for all students.

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## HIGH LEVEL TOPICS

## SESSION 1

### INTRO TO CYBER SECURITY

**References:**

Lynda.com: Practical Cybersecurity with Malcolm Shore (subscription fee)

OpenLearn: Introduction to Cyber Security

Cisco Network Academy: Introduction to Cubersecurity (Available to Cisco Networking Academies)

Youtube: Introduction to Cyber Security by Bob Boiko at the University of Washington

Introduction to Cyber Security by Stephen Lahanas, Principal Consultant at Semantech Inc.

FutureLearn: Introduction to Cyber Security by Cory Doctorow

Air Force Association's CyberPatriot: Introduction to CyberPatriot and Cybersecurity

Hacker High School Security: Awareness for Teens

### CAREER OPPORTUNITIES

**References:**

Explore A Career in Cybersecurity

Jobs in Cyber Security

Cyber Security Careers: What You Need To Know To Advance In The Security Field

### ETHICS

**References:**

AFA CYBER ETHICS MODULE

Cyber Ethics and Online Safety

### CONFIDENTIALITY INTEGRITY AND AVAILABILITY CONCEPTS

**References:**

Principles of Cybersecurity

Confidentiality, integrity, and availability (CIA triad)

Confidentiality, Integrity & Availability

Youtube: Confidentiality, Integrity, and Availability of Computer Security

Youtube: Understanding Confidentiality, Integrity, and Availability - CompTIA Security+

### THREAT VS. VULNERABILITY

- Threat overviews and threat realization

**References:**

Risk vs Threat vs Vulnerability – and Why You Should Know the Differences

Youtube: Threats, Vulnerabilities, and Controls

Difference Between Threat, Vulnerability and Risk

Understanding risk, threat, and vulnerability

Youtube: Vulnerabilities, Threat Vectors, and Probability

What is a threat, vulnerability, and risk?

### OS OVERVIEWS:

**Windows:**

Windows: An Overview

Microsoft Windows Overview

An Overview of Windows 7

An overview of Windows 8 and 8.1

**Linux:**

Introduction to Linux: A Hands on Guide

Youtube: Introduction to Linux

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## SYSTEM HARDENING:

- How to disable services, and alternative solutions (crontab, firewall, permissions etc)
- Basic web server security

**Linux References:**

25 Hardening Security Tips for Linux Servers

Which services do we really need?

Linux Security Checklist

Understanding Linux Services

How To Set Up a Firewall with UFW on Ubuntu 14.04

How to Install and Configure UFW

Apache Web Server Security and Hardening Tips

Cisco Networking Academy: Linux Essentials (Available to Cisco Networking Academies)

**Windows References:**

Cyber Patriot Microsoft Windows Security

Windows 7 security - Everything you need to know

Harden Windows 7 SP1 64bit

How to Start & Use The Windows Firewall with Advanced Security

Windows 7 Service Configurations

Configure Web Server Security (IIS 7)

Securing IIS Server Checklists

# SESSION 2

## NETWORK REMOTE ACCESS OPTIONS:

- Correlation of process and sockets - layer4 to process

## NETWORKING:

- LAN
- WAN
- Internet
- OSI model / TCP/IP model
- IPv4, IPv6 - How addresses work
- Network protocols and communications
- ARP/MAC, other relevant protocols
- Ports and protocols why and how
- Well-known ports and protocols
- Anonymous FTP
- SSH

**References:**

Professor Messer: Network+ Videos

## BASIC NETWORK SECURITY:

- Basic network security how to.

**References:**

Professor Messer: Security+ Videos

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# NETWORKING & CYBER SECURITY GRADE 12

## SESSION 3

### BASIC NETWORKING WITH CISCO

- ACL
- Getting help in Cisco
- Basic router configuration

**References:**

Youtube: Basic Cisco Networking - Introduction

Youtube: Packet Tracer 6.2

### BASIC NETWORK RECONNAISSANCE:

- Reconnaissance basics
- Scanning methods - connect, rset
- UDP scans vs. TCP (why is UDP)
- Wireshark/protocol analysis

Professor Messer Security+ Videos: (Scroll down to section 2.4 – Basic Forensics)

Youtube: Wireshark Tutorials for Beginners Playlist

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