Course Syllabus

Jump to Today

UNDER CONSTRUCTION!

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Pre-Requisites:	One of CPEN 331, CPEN 333, CPSC 313
Course discussion forum and announcements:	Piazza (https://piazza.com/ubc.ca/winterterm12023/cpen4422023w1/home) (click the link to register)
Lectures:	Tue 12:30pm–2:00pm, MCLD 2002 Thu 12:30pm–2:00pm, MCLD 2002
Lab sessions:	Fri 2:00pm–4:00pm, Orchard Commons 1001

Course Overview

This course provides an introduction to security issues in various aspects of computing, including programs, operating systems, networks, and Internet applications. The course examines causes of security breaches, and gives methods to help prevent them.

Students completing this course are expected to be able to identify security issues in programs, operating systems, network, and internet applications, and use this awareness to design systems

that are more protective of security and privacy.

Course Outline

Module 1: Introduction to Cybersecurity
Definitions of cybersecurity, privacy, types of attacks, and methods of defense
Module 2: Program Security
Security programs, non-malicious program errors, malicious code, controls against program threats
Module 3: Operating System Security
Memory protection, access control, user authentication
Module 4: Network Security
Network threats, firewalls, intrusion detection systems
Module 5: Internet Applications Security (Cryptography)
Basics of cryptography, symmetric cryptography, public-key cryptography, integrity and authentication
Module 6: Cryptography Use-cases
Applications of cryptography at the link, network, transport, and application layers. Anonymous communication systems. Blockchain.
Module 7: Non-technical Aspects of Cybersecurity
Usability, economics, ethics, and law

Grading Scheme, Activities, and Assessments

Evaluation Method	Grade %
Module quizzes	5
Assignments	45
Midterm exam	5
Final exam	15
Group projects	30

Lectures: this offering of CPEN 442 will use a traditional delivery, where the instructor presents the course contents in the lectures, following slides that will be available beforehand on Canvas, under the **Modules (https://canvas.ubc.ca/courses/123401/modules)** section. Attendance is highly encouraged, but **is not mandatory**. If a student misses a lecture, it is the student's responsibility to keep up with the course content, announcements, and solutions to possible in-class activities. Please use **Piazza (https://piazza.com/ubc.ca/winterterm12023/cpen4422023w1/home)** or come to office hours to clarify any content regarding the lectures.

Lab sessions: the lab sessions offer an opportunity for students to work in groups, both in their assignments or their group project. Attendance **is not mandatory**, but please do attend if that is

what your group has decided. A TA will be present in specific lab sessions to provide support with the assignments. In specific sessions, that will be announced during the lectures, the instructor will also be present to provide feedback on the group projects.

Module quizzes: There will be **seven quizzes**: one for each of the course modules. Each quiz will be available on Canvas for a period of **one week**. Students get **three attempts**. Please check the calendar for the quiz deadlines. Quizzes must be done at any point during the week in which they are available; **no make-up quizzes** will be given.

Assignments: There will be **three assignments**, all together accounting for 45% of the final grade. All assignments will be done in **groups**. Before each assignment, the instructor will explain in the classroom and Piazza how groups will be formed, and which techniques will be in place to make sure everyone in the group contributes to the assignment submission. Please check the calendar for the assignment deadlines.

Midterm exam: The midterm exam will be **open-book**. The tentative date is **Oct 10th**; the instructor will provide more details over the weeks before the exam. **No make-up midterm** exam will be given; if a student misses the midterm examination, their mid-term mark will be the same (percentage-wise) as their final examination mark.

Final exam: The final exam will be **open-book** and will cover content from *all* modules. The date of the final examination will be set and announced by the UBC services. It's the student's responsibility to know the date, time, and location of the final examination.

Group project: Students will work in groups of 4 students in a project related to security and/or privacy. The topic of the project will be chosen by the students and approved by the course instructor. The mechanics of the group project are explained below.

Group project

The group project will span the whole term. At the beginning of the course, the students will propose project ideas. The instructor will select ideas, and students will vote for their preferences. Groups will be formed based on these preferences. Halfway through the course, students will provide a 1-page summary of their project. At the end of the course, students will submit a 10-page written proposal, a short video explaining each student's contribution to the project, and present their project in a mini-conference. The last lectures (and/or lab sessions) of the conference will be project presentations (exact number to be determined based on enrollment numbers).

1. Project idea proposals:

> At the beginning of the course, students will send group project ideas to the instructor, using [to be decided]. A project idea consists of:

- A project title
- One or two-paragraph description of the project

The paragraph description should both clarify the topic of the project, plus the direction of the project. The project must have security and/or privacy implications. As a general recommendation: choose a topic that you are familiar with/passionate about, and find a security and/or privacy focus for it. To get inspiration, check **previous year's projects (https://blogs.ubc.ca/cpen442/term-projects/previous-years-reports/)** . To find relevant areas of security/privacy, it is recommended to check the programs of the tier-1 security conferences:

- IEEE Security and Privacy
- ACM Conference on Computer and Communications Security (CCS)
- USENIX Security Symposium
- Network and Distributed Systems Security Symposium (NDSS)

For projects with a more focus on privacy, check the Privacy-Enhancing Technologies Symposium (PETS).

Broadly speaking, a project can be an analysis project, a design project, or an implementation project. You can read more about these on **last year's website (https://blogs.ubc.ca/cpen442/term-projects/)** . Systematization of Knowledge (SoK) projects will also be accepted.

Project ideas will be used to form the groups, but once the groups have been formed, students are free to slightly **modify** their topic (it is recommended to check with the instructor for these, especially if the changes are non-trivial).

Students are also welcome to submit more than one project idea (details will be available soon).

A student will have preference to be assigned to a project that they have proposed (the exact details of the voting scheme will be available at a later date).

2. Project voting

The details regarding project voting will be available at a later date.

3. Project 1-page summary

The details will be available at a later date.

4. Project 10-page written report

The details will be available at a later date. Check **last year's guidelines (https://blogs.ubc.ca/cpen442/term-projects/)** for an approximate idea for this term's guidelines.

5. Mini-conference

The details will be available at a later date. Check **last year's guidelines (https://blogs.ubc.ca/cpen442/term-projects/)** for an approximate idea for this term's guidelines.

Course materials

The course slides will be available on Canvas, under the **Modules (https://canvas.ubc.ca/courses/123401/modules)** section. The course structure and content will closely follow the ***CS458 – Computer Security and Privacy*** **(https://crysp.uwaterloo.ca/courses/cs458/)** course from the University of Waterloo. The original slide deck of CS458 was mostly designed by Prof. Ian Goldberg and Prof. Urs Hengartner from the **CrySP** **(https://crysp.uwaterloo.ca/)** research group, and over the years other CrySP faculty, students, and post-docs contributed to the content. A smaller part of this term's CPEN 442 content will also be adapted from ***CS 489/689 – Privacy, Cryptography, Network and Data Security*** ***(https://crysp.uwaterloo.ca/courses/data-sp/W23/)*** also from the University of Waterloo, taught by Prof. Bailey Kacsmar and Thomas Humphries.

There are two r**ecommended textbooks** for this offering of CPEN 442:

- *van Oorschot* "Tools and Jewels". Publicly available at the **author's website (https://people.scs.carleton.ca/~paulv/toolsjewels.html)** .
- *Stamp* "Information Security: Principles And Practice". Available online at the Campus Library

If additional readings are assigned, they will also be publicly available.

UBC Policy on Academic Integrity

The academic enterprise is founded on honesty, civility, and integrity. As members of this enterprise, all students are expected to know, understand, and follow the UBC codes of conduct regarding academic integrity. At the most basic level, this means submitting only original work done by you and acknowledging all sources of information or ideas and attributing them to others as required. This also means you should not cheat, copy, or mislead others about what is your work. Violations of academic integrity (i.e., misconduct) lead to the breakdown of the academic enterprise, and therefore serious consequences arise and harsh sanctions are imposed. For example, incidents of plagiarism or cheating may result in a mark of zero on an assignment or exam and more serious consequences may apply if the matter is referred to the President's Advisory Committee on Student Discipline. Careful records are kept in order to monitor and prevent recurrences.

For more information, see UBC's **Academic Honesty and Standards (https://vancouver.calendar.ubc.ca/campus-wide-policies-and-regulations/academic-honesty-and-standards)** .

Health and Wellness

UBC provides resources to support student learning and to maintain healthy lifestyles, while recognizing that challenges and crises can arise for students. There are resources in ECE and at UBC where students can find can help and support, including wellness, equity, inclusion and indigeneity, resources for survivors of sexual violence, and health. Some frequently used resources are as follows:

- **ECE Wellness Hub** (https://ece.ubc.ca/student-life/student-wellness/)
- ECE has an EDI.I committee whose goals are to improve equity, diversity and inclusion in the ECE Department, and support the **UBC Indigenous Strategic Plan** (https://indigenous.ubc.ca/indigenous-engagement/indigenous-strategic-plan/). The committee welcomes feedback from all students, and can be contacted by emailing **help@ece.ubc.ca** (mailto:help@ece.ubc.ca).
- **Central resource for supporting student success** (https://senate.ubc.ca/policies-resources-support-student-success/) (medical and crisis support, Centre for Accessibility, and support for survivors of sexual violence)
- **UBC Office of the Ombudsperson for Students** (https://ombudsoffice.ubc.ca/how-we-can-help/)

UBC values respect for the person and ideas of all members of the academic community. Harassment and discrimination are not tolerated nor is suppression of academic freedom. UBC provides appropriate accommodation for students with disabilities and for religious, spiritual and cultural observances. UBC values academic honesty and students are expected to acknowledge the ideas generated by others and to uphold the highest academic standards in all of their actions. Details of UBC's respectful environment policies, which all students, staff and faculty are expected to follow, can be found **here** (https://hr.ubc.ca/working-ubc/respectful-environment).

Academic Concession

The University is committed to supporting students in their academic pursuits. Students may request academic concession in circumstances that may adversely affect their attendance or performance in a course or program. Students who intend to, or who as a result of circumstance must, request academic concession must notify their instructor, dean, or director as specified in **this link** (https://vancouver.calendar.ubc.ca/campus-wide-policies-and-regulations/academic-concession).

Students seeking academic concession due to absence from the final exam for any reason must apply to Engineering Academic Services (EAS) within 72 hours of the missed exam. This is a standard practice for all final examinations at UBC. For more information, see the this link: **academic concession** (https://academicservices.engineering.ubc.ca/exams-grades/academic-concession/).

Land Acknowledgement

This course is held on the UBC Point Grey (Vancouver) campus, which sits on the traditional, ancestral, unceded territory of the Coast Salish Peoples, including xʷməθkʷəy̓əm (Musqueam) First Nation, Squamish, Tsleil-Waututh, Stz'uminus, and Stó:lō First Nations. UBC is implementing its **Indigenous Strategic Plan** (https://indigenous.ubc.ca/indigenous-engagement/indigenous-strategic-plan/), taking a leading role in the advancement of Indigenous peoples' human rights. To learn more about the Faculty of Applied Science's role in building upon the Indigenous Strategic Plan and committing to Truth and Reconciliation, please visit: **https://apsc.ubc.ca/EDI.I** (https://apsc.ubc.ca/EDI.I)

Changelog:

- Sep 14: updated course room to MLCD 2002, added TA emails.

Course Summary:

Date	Details	Due
Fri Sep 15, 2023	**Project Idea Submissions** (https://canvas.ubc.ca/courses/123401/assignments/1672200)	due by 11:59pm
Sun Sep 24, 2023	**Quiz 1** (https://canvas.ubc.ca/courses/123401/assignments/1673396)	due by 11:59pm
Tue Oct 10, 2023	**Midterm Exam** (https://canvas.ubc.ca/courses/123401/assignments/1672223)	due by 2pm
Fri Oct 13, 2023	**Assignment 1** (https://canvas.ubc.ca/courses/123401/assignments/1672220)	due by 11:59pm
Fri Nov 3, 2023	**Assignment 2** (https://canvas.ubc.ca/courses/123401/assignments/1672221)	due by 11:59pm
Fri Nov 24, 2023	**Assignment 3** (https://canvas.ubc.ca/courses/123401/assignments/1672222)	due by 11:59pm