COMP 4108A (Sept 2020): Computer Systems Security


Course website (for updates): http://people.scs.carleton.ca/~paulv/4108sep2020.html

Course description (from official calendar): Introduction to information security in computer and communications systems, including network, operating systems, web and software security. Passwords, authentication applications, privacy, data integrity, anonymity, secure email, IP security, security infrastructures, firewalls, viruses, intrusion detection, network attacks. Lectures three hours a week.

Prerequisites: one of COMP 3203 (Principles of Computer Networks) or SYSC 4602 (Computer Communications); and one of COMP 3000 (Operating Systems), SYSC 3001 (Operating Systems and Databases), SYSC 4001 (Operating Systems). Otherwise requires written instructor permission. Students missing required prerequisites will be removed from the course.

Lectures (online): 8:35-9:55am Mon+Wed. (Online access details will be sent by cuLearn; students registered in the course are automatically granted access to this)

Term dates: 2020 Sept.9-Dec.11, excluding Oct.12 (Thanksgiving) and Oct.26-30 (fall break)

TAs: see lab page (below) for TA contact details and hours

Instructor: P. Van Oorschot

Office hours by video: Mon 10-11am, Tues 1:00-2:00pm


Evaluation:

25%: Paper 1, written project (due Fri. Oct.23, 23:59pm). Knowledge and understanding of course textbook will be required for this project.

25%: Paper 2, written project (due Sun. Dec.13, 23:59pm). Knowledge and understanding of course textbook will be required for this project.

50%: Five (5) programming-based lab assignments, 10% each. Labs are individual (not group work). Students should regularly check this lab page (click here) for details and due dates; labs typically available two weeks before due date.

Due dates for Labs 1-5 (subject to change by TA; see lab page): Sept. 25, Oct. 9, Nov. 6, Nov. 20, Dec. 4.

Timeliness: late assignments and projects receive a zero (0) grade by default, unless special permission has been granted in writing, in advance. You are advised to submit your final work at least one hour in advance of the official due date/time, in anticipation of electronic glitches, software or system outages, and connectivity issues.

Lab access: Lab assignments involve remote access using generic computing equipment. Students may need an OpenStack account if they do not already have one from a previous course; consult the lab page (above) for details. For any course content on password-protected web pages, the lab page will indicate how to get an access password (e.g., via the TA or cuLearn). If you require further assistance regarding access to computing resources to complete specific aspects of this course, please contact the TA or Instructor. Generic SCS computer lab and technical support info can be found at https://carleton.ca/scs/technical-support/

Course objectives: to understand fundamental principles of computer security; to become aware of how computer systems are vulnerable to exploitation, and corresponding protection means; to understand practical threats and carry out simple security analysis useful in software and system development; to gain both theory and hands-on familiarity with selected concepts in operating systems and Internet security.
**Instruction format.** Online classes (video-meet) will be held during the scheduled class hours, relying on the cuLearn platform for disseminating access information. The required textbook will be closely followed. It was written specifically for this course by the course Instructor. Students are expected to read textbook chapters in advance, and be ready to discuss and ask questions during online classes. Classes will highlight items of primary importance and will expand on topics of specific interest to students. The classes are not a substitute for reading the textbook itself, but rather to complement the essential details available within it. If you are not physically in Ottawa this term and in a different time zone, email the Instructor during the first week of class including your registration student ID and details of your country/time zone, to discuss suitable accommodation.

**Topics outline.** The following topics will be covered, directly from the course text.

- Chapter 1: Basic concepts and principles.
- Chapter 2: Cryptographic background.
- Chapter 3: User authentication.
- Chapter 4: Authentication protocols and key establishment.
- Chapter 5: Operating system security and access control.
- Chapter 6: Software security---exploits and privilege escalation.
- Chapter 7: Malicious software.
- Chapter 8: Public key certificate management and use cases.
- Chapter 9: Web and browser security.
- Chapter 10: Firewalls and tunnels.
- Chapter 11: Intrusion detection and network-based attacks.

=== Additional Information on SCS Courses ===

**Undergrad Academic Advisor for SCS:** 5302C-HP (room), 520-2600 ext 4364 (phone), undergraduate_advisor@scs.carleton.ca (email). This advisor can assist with information about prerequisites and preclusions, course substitutions/equivalencies, understanding your academic audit and the remaining requirements for graduation. The advisor can also refer students to appropriate resources such as the Science Student Success Centre, Learning Support Services and Writing Tutorial Services.

**Academic Integrity violations within the Faculty of Science.** Students found in violation of the Student Academic Integrity Policy (below) in Computer Science (COMP) courses are subject to severe penalties, as detailed at the Office of the Dean of Science (ODS) page: [https://science.carleton.ca/academic-integrity](https://science.carleton.ca/academic-integrity). If you are unsure of the expectations regarding academic integrity (how to use and cite references, how much collaboration with lab- or class-mates is appropriate), ASK your instructor or the head TA for your labs. Sharing assignment or quiz specifications or posting them online (to sites such as Chegg, CourseHero, OneClass) is considered academic misconduct. You are never permitted to post, share, or upload course materials without explicit permission from your instructor.

**COMP 4108 addendum on integrity violations:** Beyond any other standard university policies, in COMP 4108 any student submitting work including uncited portions originating from someone else, is subject to a mark of negative 100% on the entire work item. For example, if a lab assignment is worth 10%, the 10% is lost plus an additional 10% penalty, making the best possible course mark 80%. Both students may be penalized if the infraction involves copying from another student. Each student must write up submitted work individually from their own personal notes, unless given permission explicitly in writing to do otherwise by the Instructor or head TA.

=== Other University Policies (generic) ===

**Requests for Academic Accommodation:** You may need special arrangements to meet your academic obligations during the term. For an accommodation request, the processes are as follows.

**Pregnancy Obligation:** Please contact your instructor with any requests for academic accommodation during
the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, visit the Equity Services site [here](#).

**Religious Obligation:** Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, visit the Equity Services site [here](#).

**Academic Accommodations for Students with Disabilities:** If you have a documented disability requiring academic accommodations in this course, please contact the Paul Menton Centre for Students with Disabilities (PMC) at 613-520-6608 or pmc@carleton.ca for a formal evaluation or contact your PMC coordinator to send your instructor your Letter of Accommodation at the beginning of the term. You must also contact the PMC no later than two weeks before the first in-class scheduled test or exam requiring accommodation (if applicable). After requesting accommodation from PMC, meet with your instructor as soon as possible to ensure accommodation arrangements are made. For more details, see the [PMC page](#).

**Survivors of Sexual Violence:** As a community, Carleton University is committed to maintaining a positive learning, working and living environment where sexual violence will not be tolerated, and survivors are supported through academic accommodations as per Carleton's Sexual Violence Policy. For more information about the services available at the university and to obtain information about sexual violence and/or support, visit [https://carleton.ca/sexual-violence-support](https://carleton.ca/sexual-violence-support).

**Accommodation for Student Activities** Carleton University recognizes the substantial benefits, both to the individual student and for the university, that result from a student participating in activities beyond the classroom experience. Reasonable accommodation must be provided to students who compete or perform at the national or international level. Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details see [here](#).

**Student Academic Integrity Policy.** Every student should be familiar with Carleton's student academic integrity policy. A student found in violation of academic integrity standards may be awarded penalties which range from a reprimand to receiving a grade of F in the course or even being expelled from the program or University. Examples of punishable offences include: plagiarism and unauthorized co-operation or collaboration. Information on this policy may be found at [https://carleton.ca/registrar/academic-integrity/](https://carleton.ca/registrar/academic-integrity/).

**Plagiarism.** As defined by Senate, "plagiarism is presenting, whether intentional or not, the ideas, expression of ideas or work of others as one's own". For Computer Science courses, such reported offences will be reviewed by the Office of the Dean of Science (ODS).

**Unauthorized Co-operation or Collaboration.** Senate policy states that "to ensure fairness and equity in assessment of term work, students shall not co-operate or collaborate in the completion of an academic assignment, in whole or in part, when the instructor has indicated that the assignment is to be completed on an individual basis". Please refer to the course outline statement or the instructor concerning this issue.

[end of policies]