Adaptive Security Course Outline (2020F)

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Course Information

- **Course Number:** COMP 5900i
- **Term:** Fall 2020
- **Title:** Adaptive Security
- **Institution:** Carleton University, School of Computer Science
Instructor: Anil Somayaji (https://people.scs.carleton.ca/~soma) (anil.somayaji at carleton.ca): by appointment

Lectures: Tues. and Thurs. 8:35-9:55 via online videoconferencing (see cuLearn for the link), September 10-December 10, 2020

Course Website: https://homeostasis.scs.carleton.ca/wiki/index.php /Adaptive_Security_(Fall_2020)

Official Course Description

Advanced computer security course on technologies and approaches that are robust against adaptive adversaries. Topics include AI, machine learning, artificial life, feedback control, randomization, and diversity as applied to computer security. Course project will involve students modelling, testing, and/or implementing their own adaptive defenses.

Learning Outcomes

In this course you will learn how to critique and evaluate adaptive security mechanisms, including ones that use diversity/randomness, machine learning, and other adaptive approaches. You will also get experience in designing adaptive security mechanisms, and you will learn the advantages and disadvantages of adaptive approaches to security.

Grading

The marking scheme for this course are:

- 70% for the course project, which should be either a research proposal or a research paper.
  - 2% areas of interest (September 18, 2020)
  - 3% elevator pitch (September 29, 2020)
  - 20% literature review (October 23, 2020)
  - 10% tests/preliminary work (November 17, 2020)
  - 5% presentation (December 8 & 10, 2020)
  - 30% research proposal/paper (Exam period)
- 20% for reading responses and journaling
- 10% for class participation

Due dates are subject to change. The various parts are explained below.

Course Project

In this course you'll be doing a term project that will produce a research paper or a research proposal. This project has multiple milestones.

You will first submit an areas of interest document that outlines the kinds of projects and the types of software systems you wish to work with. Then, you'll submit an "elevator pitch" which will be a few paragraph summary of your idea,
concisely communicating the basic idea for your project. You’ll then submit a literature review related to your idea and a report on preliminary findings/tests before finally presenting your work to the class and, finally, submitting your completed paper or proposal. Through this process you should produce work that will either be publishable or is on the path to creating something publishable in the security literature.

**Reading Responses & Journaling**

For this class you’ll maintain an electronic research journal which will detail your ongoing thoughts related to this class. You should record your responses to assigned readings, ideas that arise from class, brainstorming for your class project, and any other relevant thoughts. The instructor will review your journal before each class so he may address any questions or concerns that arise in your writings.

You may use any application to maintain your journal so long as it is easily shared with the course instructor. Journals will be graded as a participation grade, with marks assigned out of 4 for each class.

**Class Participation**

You are expected to attend most class meetings and participate in asynchronous class discussions. Students making a genuine effort to participate will earn most of these marks (with a bit reserved for truly exceptional participation).

**Communication and Lectures**

This course is a virtual course using a mix of synchronous and asynchronous communication. We will use videoconferencing for scheduled class time and an online discussion forum for communication outside of class. The course webpage listed above is the canonical source of information for everything regarding this course except for private information (such as video call links, invites to discussion forums) which is available through the course's cuLearn page.

**Collaboration**

Participation and reading responses/journaling are graded individually. The course project should also be done on your own unless the instructor allows you to work in pairs. Having said this, you will be collaborating with other students in this class. When you have worked with others, outside contributions should be clearly acknowledged as they should be in any academic endeavor. All participants in the class are expected to act with the highest intellectual integrity, and violations of that integrity may be reported to the academic dean for disciplinary action.

**Course Notes**

Notes from class will be posted to the class page. As part of class participation, students may (optionally) contribute to these notes.

**Required Textbooks**
There is no required textbook. Assigned readings will be posted to the course page throughout the term.

**Course Software**

There is no required course software. However, depending on your project you will likely be creating applications. While support will be provided in class where feasible, ultimately students will be responsible for their own software development environments.

**University Policies & Resources**

**Graduate Academic Advisor**

The graduate advisors for the School of Computer Science are available via email at Grad.SCS@cunet.carleton.ca. The advisor can assist with information about prerequisites and preclusions, course substitutions/equivalencies, understanding your academic audit and the remaining requirements for graduation. The graduate advisors will also refer students to appropriate resources such as the Science Student Success Centre, Learning Support Services and the Writing Tutorial Services.

**Student Academic Integrity Policy**

Every student should be familiar with the Carleton University 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. Some examples of offences are: plagiarism and unauthorized co-operation or collaboration. Information on this policy may be found in the Graduate Calendar.

**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". Such reported offences will be reviewed by the office of the Dean of Science. The Dean of Science now has the following minimum penalties:

- First offence, first-year students (< 4.0 cr): Final grade reduction of one full grade (e.g., A- becomes a B-, if that results in an F, so be it)
- First offence (everyone else): F in the course
- Second offence: One-year suspension from program
- Third offence: Expulsion from the University

More-severe penalties will be applied in cases of egregious offences (e.g., a first-year student accessing CULearn from their phone during an exam will be given an F in the course; bribing a faculty member for a better grade would be grounds for suspension, etc.)

**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 see above for the specific collaboration policy for this course.

**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 website: https://carleton.ca/equity/wp-content/uploads/Student-Guide-to-Academic-Accommodation.pdf

**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 website: https://carleton.ca/equity/wp-content/uploads/Student-Guide-to-Academic-Accommodation.pdf

**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. carleton.ca/pmc

**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 is 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

**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. [https://carleton.ca/senate/wp-content/uploads/Accommodation-for-Student-Activities-1.pdf](https://carleton.ca/senate/wp-content/uploads/Accommodation-for-Student-Activities-1.pdf)

For more information on academic accommodation, please contact the departmental administrator or visit: [https://students.carleton.ca/course-outline](https://students.carleton.ca/course-outline)

**Medical Certificate**

The following is a link to the official medical certificate accepted by Carleton University for the deferral of final examinations or assignments in undergraduate courses. To access the form, please go to [https://www.carleton.ca/registrar/forms](https://www.carleton.ca/registrar/forms)


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