COURSE OUTLINE

1. Course: CPSC 525, Principles of Computer Security - Fall 2023

Lecture 01: MWF 14:00 - 14:50 in EDC 179

<table>
<thead>
<tr>
<th>Instructor</th>
<th>Email</th>
<th>Phone</th>
<th>Office</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr Ryan Henry</td>
<td><a href="mailto:ryan.henry@ucalgary.ca">ryan.henry@ucalgary.ca</a></td>
<td>403 210-6307</td>
<td>ICT 643</td>
<td>Fridays @ 12:00-13:30pm via Zoom, or by appointment</td>
</tr>
</tbody>
</table>

To account for any necessary transition to remote learning for the current semester, courses with in-person lectures, labs, or tutorials may be shifted to remote delivery for a certain period of time. In addition, adjustments may be made to the modality and format of assessments and deadlines, as well as to other course components and/or requirements, so that all coursework tasks are in line with the necessary and evolving health precautions for all involved (students and staff).

In Person Delivery Details:

Lectures on Mondays and Wednesdays will be in person. On most (but not all!!) Fridays, lectures will occur via Zoom and will be devoted to live coding by the instructor and/or students engaging in hands-on activities (like interacting with code and security-relevant software).

Online Delivery Details:

This course is being offered online in real-time via scheduled meeting times, you are required to be online at the same time.

To help ensure Zoom sessions are private, do not share the Zoom link or password with others, or on any social media platforms. Zoom links and passwords are only intended for students registered in the course. Zoom recordings and materials presented in Zoom, including any teaching materials, must not be shared, distributed or published without the instructor’s permission.

Many (but not all!!) Friday lectures will occur via Zoom and will be devoted to live coding by the instructor and/or students engaging in hands-on activities (like interacting with code and security-relevant software). For these remote lectures, each student should have access to their own computer (lab computers are fine, but each student should have their own keyboard). The regular room will be available for students during lecture time; however, there is no specific expectation about where students will be physically located when they log into Zoom lectures.

The required computing environment will be provided to students, so there are no specific requirements regarding OS or hardware specifications on student devices.

Course Site:

https://d2l.ucalgary.ca/d2l/home/542643

Note: Students must use their U of C account for all course correspondence.

Equity Diversity & Inclusion:

The University of Calgary is committed to creating an equitable, diverse and inclusive campus, and condemns harm and discrimination of any form. We value all persons regardless of their race, gender, ethnicity, age, LGBTQIA2S+ identity and expression, disability, religion, spirituality, and socioeconomic status. The Faculty of Science strives to extend these values in every aspect of our courses, research, and teachings to better promote academic excellence and foster belonging for all.

2. Requisites:

See section 3.5.C in the Faculty of Science section of the online Calendar.

Prerequisite(s):
Computer Science 457; and 3 units from Computer Science 351, Mathematics 271 or 273.
Antirequisite(s):
Credit for Computer Science 525 and either 529 or 625 will not be allowed.

Experience with C/C++ is useful but not a formal requirement.

3. Grading:

The University policy on grading and related matters is described in F.1 and F.2 of the online University Calendar.

In determining the overall grade in the course the following weights will be used:

<table>
<thead>
<tr>
<th>Course Component</th>
<th>Weight</th>
<th>Due Date (duration for exams)</th>
<th>Modality for exams</th>
<th>Location for exams</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blog Task</td>
<td>10%</td>
<td>Ongoing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participation</td>
<td>5%</td>
<td>Ongoing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>In-class worksheets</td>
<td>20%</td>
<td>Ongoing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assignment 1</td>
<td>11.25%</td>
<td>Sep 28 2022</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assignment 2</td>
<td>22.5%</td>
<td>Nov 02 2022</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assignment 3</td>
<td>11.25%</td>
<td>Nov 30 2022</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Final project</td>
<td>20%</td>
<td>Dec 07 2022</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Each piece of work (reports, assignments, quizzes, midterm exam(s) or final examination) submitted by the student will be assigned a grade. The student's grade for each component listed above will be combined with the indicated weights to produce an overall percentage for the course, which will be used to determine the course letter grade.

The conversion between a percentage grade and letter grade is as follows.

<table>
<thead>
<tr>
<th>Minimum % Required</th>
<th>A+</th>
<th>A</th>
<th>A-</th>
<th>B+</th>
<th>B</th>
<th>B-</th>
<th>C+</th>
<th>C</th>
<th>C-</th>
<th>D+</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>96.667%</td>
<td>93.333%</td>
<td>90%</td>
<td>86.667%</td>
<td>83.333%</td>
<td>80%</td>
<td>76.667%</td>
<td>73.333%</td>
<td>70%</td>
<td>65%</td>
<td>60%</td>
</tr>
</tbody>
</table>

The University of Calgary offers a flexible grade option, Credit Granted (CG) to support student’s breadth of learning and student wellness. Faculty units may have additional requirements or restrictions for the use of the CG grade at the faculty, degree or program level. To see the full list of Faculty of Science courses where CG is not eligible, please visit the following website: https://science.ucalgary.ca/current-students/undergraduate/program-advising/flexible-grading-option-cg-grade

4. Missed Components Of Term Work:

In the event that a student legitimately fails to submit any online or in-person assessment on time (e.g. due to illness, domestic affliction, etc...), please contact the course coordinator, or the course instructor if this course does not have a coordinator to arrange for a re-adjustment of a submission date, or possible exemption and reweighing of components. Absences not reported within 48 hours will not be accommodated. Students may be asked to provide supporting documentation (Section M.1) for an excused absence, See FAQ.

If an excused absence is approved, options for how the missed assessment is dealt with is at the discretion of the coordinator or course instructor. Some options such as an exemption and pro-rating among the components of the course may not be a viable option based on the design of this course.

The lowest in-class worksheet grade will be automatically dropped.

5. Scheduled Out-of-Class Activities:

There are no scheduled out of class activities for this course.

6. Course Materials:

In order to successfully engage in their learning experiences at the University of Calgary, students taking online, remote and blended courses are required to have reliable access to the following technology:

- A computer with a supported operating system, as well as the latest security, and malware updates;
- A current and updated web browser;
- Webcam/Camera (built-in or external);
- Microphone and speaker (built-in or external), or headset with microphone;
- Current antivirus and/or firewall software enabled;
- Stable internet connection.

For more information please refer to the UofC E Learning online website.
7. Examination Policy:
   No aids are allowed on tests or examinations.
   Students should also read the Calendar, Section G, on Examinations.

8. Approved Mandatory And Optional Course Supplemental Fees:
   There are no mandatory or optional course supplemental fees for this course.

9. Writing Across The Curriculum Statement:
   For all components of the course, in any written work, the quality of the student's writing (language, spelling, grammar, presentation etc.) can be a factor in the evaluation of the work. See also Section E.2 of the University Calendar.

10. Human Studies Statement:
    Students will not participate as subjects or researchers in human studies.
    See also Section E.5 of the University Calendar.

11. Reappraisal Of Grades:
    A student wishing a reappraisal, should first attempt to review the graded work with the Course coordinator/instructor or department offering the course. Students with sufficient academic grounds may request a reappraisal. Non-academic grounds are not relevant for grade reappraisals. Students should be aware that the grade being reappraised may be raised, lowered or remain the same. See Section I.3 of the University Calendar.
    a. Term Work: The student should present their rationale as effectively and as fully as possible to the Course coordinator/instructor within ten business days of either being notified about the mark, or of the item's return to the class. If the student is not satisfied with the outcome, the student shall submit the Reappraisal of Graded Term work form to the department in which the course is offered within 2 business days of receiving the decision from the instructor. The Department will arrange for a reappraisal of the work within the next ten business days. The reappraisal will only be considered if the student provides a detailed rationale that outlines where and for what reason an error is suspected. See sections I.1 and I.2 of the University Calendar.
    b. Final Exam: The student shall submit the request to Enrolment Services. See Section I.3 of the University Calendar.

12. Other Important Information For Students:
    a. Mental Health: The University of Calgary recognizes the pivotal role that student mental health plays in physical health, social connectedness and academic success, and aspires to create a caring and supportive campus community where individuals can freely talk about mental health and receive supports when needed. We encourage you to explore the mental health resources available throughout the university community, such as counselling, self-help resources, peer support or skills-building available through the SU Wellness Centre (Room 370, MacEwan Student Centre, Mental Health Services Website) and the Campus Mental Health Strategy website (Mental Health).
    b. SU Wellness Services: For more information, see their website or call 403-210-9355.
    c. Sexual Violence: The Sexual Violence Support Advocate, Carla Bertsch, can provide confidential support and information regarding sexual violence to all members of the university community. Carla can be reached by email (svsa@ucalgary.ca) or phone at 403-220-2208. The complete University of Calgary policy on sexual violence can be viewed here.
    d. Student Ombuds Office: A safe place for all students of the University of Calgary to discuss student related issues, interpersonal conflict, academic and non-academic concerns, and many other problems.
    e. Student Union Information: SU contact, Email your SU Science Reps: science1@su.ucalgary.ca, science2@su.ucalgary.ca, science3@su.ucalgary.ca.
    f. Academic Accommodation Policy:
       It is the student’s responsibility to request academic accommodations according to the University policies and procedures listed below. The student accommodation policy can be found at: https://www.ucalgary.ca/legal-services/sites/default/files/teams/1/Policies-Student-Accommodation-Policy.pdf.
Course Outcomes:

By the end of the course, students should be able to:

- list three major security models (Biba, Bell-LaPadula, and Clark-Wilson), enumerate the rules defining each model, and identify the standard purpose of each model.
- explain the genesis of the field of computer systems security by referencing the seminal security literature elucidating those models in addition to the seminal work on protection domains; the students should be able to map the memory protection concepts in the research literature circa 1970 to the memory protection techniques used in modern processors.
- demonstrate the operation of common access control mechanisms in operating systems, among others; in addition, students should be able to offer a critique of common access control models like RBAC.
- explain how coding mistakes lead to specific classes of code injection vulnerabilities; students should be capable of both purposefully writing and exploiting such weakness; students should be able to list common, deployed countermeasures to code injection attacks.
- hypothesize how such failure states could be customized for external control of the compromised application.
- list common, deployed countermeasures to code injection attacks.
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- explain how coding mistakes lead to specific classes of code injection vulnerabilities; students should be capable of both purposefully writing and exploiting such weakness; students should be able to list common, deployed countermeasures to code injection attacks.
• Using the Security Mindset, students should be able to critique an arrangement of protection mechanisms, or a system, or program logic; the student demonstrates the validity of such a critique by offering evidence that their crafted input has some correlation with the perceived coding mistake.

• By the end of the course, students should use common debugging and program analysis tools and frameworks to explain the internal state of programs and systems to an observer and hypothesize how the program or system reached that state, including identifying any cross-layer interactions, composition of trust relationships in the software, and the efficacy or influence of countermeasures.

• By the end of the course, students should be able to list common static analysis techniques and tools and demonstrate the ability to run such tools on real, large software code. Students should also be able to list common (e.g., NIST) security evaluation standards; the advanced student will be able to list specific evaluation criteria from the appropriate model.

• By the end of the course, students should be able to use their knowledge of evaluation standards, the Security Mindset, and analysis tools to produce a security review of a product, protection technique, or security mechanism.