

## **CY 609: SOFTWARE SECURITY**

### **School of Computing & Technology**

3 Credits

Summer 2022

Grading Type: Decimal

*Access to the Internet is required.*

*All written assignments must be in Microsoft-Word-compatible formats.*

*See the library's APA Style Guide tutorial for a list of resources that can help you use APA style.*

## Faculty Information

Professional experience information for instructors is found under *Faculty Information* in the online course menu.

## Contact Information

Contact information for instructors is found under *Faculty Information* in the online course menu.

**Email:** [first name]

**Phone:** [xxx-xxx-xxxx]

**Office Hours and Response Time:** [I am available through MS Teams XXday and XXday nights between x-p.m.- x-p.m. I will respond within 24 hours. I will grade within 3 business days after the due date.]

**Bio:** (keep images under 300px wide)

## Course Description

This course practices the development and use of software that reliably preserves the security properties of the information and systems it protects. Topics include fundamental and advanced security and software design principles, documentation, and systems requirements. Candidates apply information learned in this course to assess and embed systems and software security into an enterprise environment.

## Course Resources

Required and recommended resources to complete coursework and assignments are found on the course [Reading List](#). The reading list can be found in the top bar in Brightspace as well as from the library homepage.

Note: Required resources that must be purchased by the student are tagged “Purchase from a vendor of your choosing.” Required resources with a direct link, “Available through CityU Library”, are available at no cost to students.

Students in Canada will see required resources they need to purchase tagged “Purchase from the Canadian Bookstore.” Students outside the U.S. and Canada should contact their advisor or textbook coordinator for additional information.

## Course Outcomes

As a result of this course, students:

1. Understand the fundamentals of design principles and secure life cycle development,
2. Apply security metrics to design, implementation, testing, deployment, and maintenance.
3. Analyze tools and techniques used to test software security.
4. Evaluate systems architecture that supports the Continuous integration/Continuous development (CICD) lifecycle.
5. Create a CICD project in a cloud environment.

## Additional Information

- Introduction
- The Secure Development Lifecycle
- Security Assessment (A1): SDL Activities and Best Practices
- Architecture (A2): SDL Activities and Best Practices
- Design and Development (A3): SDL Activities and Best Practices
- Design and Development (A4): SDL Activities and Best Practices
- Ship (A5): SDL Activities and Best Practices
- Post-Release Support (PRSA1–5)
- Applying the SDL Framework to the Real World
- Pulling It All Together: Using the SDL to Prevent Real-World Threats

## Grading Scale

The grades earned for the course will be calculated using City University of Seattle's decimal grading system, found in the current University Catalog (<https://www.cityu.edu/catalog/>).

Grading rubrics with details on how each assignment will be graded are located under *Assignments* and/or in *My Grades* in the online course menu. Students should review the rubric for each assignment prior to completing their work in order to understand how it will be assessed.

OVERVIEW OF REQUIRED ASSIGNMENTS	% OF FINAL GRADE	POINTS
<b><i>Instructor Determined Assignments</i></b>	<b>30%</b>	
The Muddiest Point (MP)	5%	50 = 5 points * 10 modules
Concept Test (CT)	5%	50 = 5 points * 10 modules
Discussion Board (DB)	10%	100 = 10 points * 10 modules
Knowledge Check (KC)	10%	100 = 10 points * 10 modules
<b><i>Major Assessments</i></b>	<b>70%</b>	
Hands-On-Skill (HOS)	10%	100 = 10 points * 100 modules
Virtual Lab (VL)	30%	300 = 30 points * 10 modules
Team Project (TP)	30%	Proposal: 30 points Progress: 70 points Final Report: 120 points Final PPT: 80 points Subtotal: 300 points
<b>TOTAL</b>	<b>100%</b>	<b>1,000 points</b>

## Course Assignments and Grading

The instructor will provide grading rubrics that will provide more detail as to how this assignment will be graded.

### The Muddiest Point (MP)

Before class, students are required to submit the Muddiest Point (MP) activity. The purpose of this activity is to stimulate student engagement. The instructor uses the MP to assess how students understood the fundamentals of design principles and secure life cycle development. The instructor also uses the MP to customize the lecture scope to implement Just-in-Time Teaching (JiTT). The MP consists of writing a brief reflective essay ( $\leq 50$  words) identifying the most confusing part (i.e., the MP) of the content covered in the upcoming module. If a student understood all concepts, the student needs to explain the most exciting aspect. There is one multiple-choice question from the required reading to demonstrate that the student understood the required readings.

Criteria	% of Grade
Participation	80%
Accuracy	20%
<b>TOTAL</b>	<b>100%</b>

### Concept Test (CT)

The instructor poses a problem based on key concepts of the fundamentals of design principles and secure life cycle development. After reflecting on the problem, students submit their response and the instructor reviews them without providing a correct answer. Students discuss their thought process and solution with a peer. Students then commit to an answer and re-submit their responses. Instructor reviews responses and thought processes with the correct answer.

<b>Criteria</b>	<b>% of Grade</b>
Engagement	100%
<b>TOTAL</b>	<b>100%</b>

### **Discussion Board (DB)**

A student posts an answer to a weekly discussion topic in the Discussion Board. The student also posts a response to two other students' posts by the end of each module related to security metrics to design, implementation, testing, deployment, and maintenance. Comments and questions should be clear and thoughtful, with correct grammar, spelling, and punctuation. The instructor will grade the quality of your discussion postings on both content and response.

<b>Criteria</b>	<b>% of Grade</b>
Participation	50%
Writing	50%
<b>TOTAL</b>	<b>100%</b>

### **Knowledge Check (KC)**

Weekly multiple choice quizzes measure knowledge concepts of the fundamentals of design principles and secure life cycle development. Focus on the underlying principles and concepts rather than memorization to solve the quizzes.

<b>Criteria</b>	<b>% of Grade</b>
Correctness	100%
<b>TOTAL</b>	<b>100%</b>

### **Hands-on Skill (HOS)**

Students pair up and practice Hands-on Skill (HOS) exercises to learn specific programming languages, application programming interfaces (APIs), or tools and techniques used to test software security related to the programming assignments or virtual labs.

<b>Criteria</b>	<b>% of Grade</b>
Practice Exercise	70%
Engagement	20%

Correctness	10%
<b>TOTAL</b>	<b>100%</b>

### Virtual Lab (VL)

Students complete cloud-based labs that support the systems architecture in the Continuous Integration/ Continuous Development (CI/CD) lifecycle. VLS involve viewing instructional documents and following systematic instructions. Activities are embedded within each lab. The activities present a challenge to complete. Each lab is graded on accuracy and writing. A student has unlimited attempts at each lab to increase their accuracy and learn the required skills. Reports submitted include a write up on their understandings and findings in their lab reports.

Criteria	% of Grade
Accuracy	80%
Writing	20%
<b>TOTAL</b>	<b>100%</b>

### Team Project (TP) Report

#### Project Description: Case Study

In the security research paper, the student will analyze how cloud-based Serverless computing impacts its security development in general. The student reflects on security principles, researches the current adversarial environment, identifies system vulnerabilities subject to exploitation in the serverfull environment, and explores remedies to thwart these threats in the serverless computing environment. For example, a student can research Serverless computing architecture security and quality analysis for back-end development or on software quality and security can be improved using the serverless computing technology.

As in any scholarly writing, students should not merely copy information from another author. Students should use evidence to support the contentions they have drawn from their findings and critically analyze related literature. In essence, each paper needs to be an analytical paper, not a summary of readings.

Students are expected to use the assigned readings, videos, and other materials throughout the quarter. Students will need to utilize additional sources that were not assigned by the professor. While stylized after an industry report, nonetheless, students are expected to employ APA formatting of citations, footnotes, and bibliography. Students must cite the sources of all ideas, facts, and information used that are not their own, even if they have put the information into their own words. Failure to do so is plagiarism. To avoid plagiarism, check "[Avoid Plagiarism.](#)"

**Rubric for TP01 and TP02**

<b>Criteria</b>	<b>% of Grade</b>
Structure	20%
Content	30%
Writing	30%
Reference	10%
Collaboration	10%
<b>TOTAL</b>	<b>100%</b>

**Learning Outcomes for TP03**

	<b>Criteria</b>	<b>Outcome</b>	<b>% of Grade</b>
<b>Software Security Principles and Practices (20%)</b>			
1	Software Security	Apply concepts, integration, and management of key components of software security.	20%
<b>Critical Thinking (60%)</b>			
2	Issue	Issue is stated and described thoroughly so that it is understood fully.	20%
3	Evidence	Information is taken from source(s) appropriate to the scope with enough interpretation and evaluation to develop a comprehensive analysis or synthesis, and expert opinions are thoroughly scrutinized.	10%
4	Context and Awareness	Thoroughly analyzes assumptions and biases, carefully evaluating contextual relevance when presenting a position.	20%
5	Conclusions	Conclusions are logical and reflect an informed evaluation of evidence and perspectives in priority order.	10%
<b>Collaboration (20%)</b>			
6	Teamwork	Works effectively on diverse, global and/or distributed teams.	10%
7	Knowledge of Cultural Frameworks	Demonstrates sophisticated understanding of the complexity of elements important to members of another culture in relation to its history, values, politics, communication styles, economy, or beliefs and practices.	5%
8	Openness to Cultural Differences	Demonstrates openness to STC's diverse student population, collaboratively and professionally communicates with team members to support a cohesive team process.	5%
	<b>TOTAL</b>		<b>100%</b>

## Team Project (TP) Presentation

The student will report on the research outcomes, development, or other project efforts to an academically appropriate committee in a public forum. The nature of the presentation content will determine the specific makeup of the audience. The student will choose the format of the presentation, in consultation with the advisor. The layout and design must be appropriate and adequate to represent the outcomes of the effort. While students must make some form of a visual presentation, the presentation of the results may include publishing in a refereed publication, publication in a trade or popular magazine or journal, broadcast in an appropriate medium, or, in exceptional cases, limited dissemination within a closed community.

Each presenter will have 15 minutes for presentation and 5 minutes for questions and answers. Each presenter must keep the total presentation time limit strictly.

Criteria	% of Grade
Structure	20%
Visual Presentation	30%
Verbal Quality & Engagement	30%
Team Collaboration	20%
<b>TOTAL</b>	<b>100%</b>

## Course Policies

Course policies on topics such as *Late Assignments*, *Participation*, and *Professional Writing* are found under *Course Information* in the online course menu. Students are responsible for reviewing and applying these policies while enrolled in this course.

## University Policies

Students are responsible for understanding and adhering to all of City University of Seattle's academic policies. The most current versions of these policies can be found in the [University Catalog](#) that is linked from the CityU Web site.

### Antidiscrimination

City University of Seattle and its staff and faculty are committed to supporting our students. We value equity, diversity, and inclusion as a way of life as well as the educational opportunities it provides. City U will not tolerate any form of discrimination based on race, color, ethnicity, sexual orientation, gender identification, socioeconomic status, or religious values. If you have experienced any discrimination based on any of the above, we encourage you to report this to the University. Please report this to your instructor. If you do not feel safe reporting this to your instructor, please report to Dr. Scott Carnz, Provost or to the Vice President of Student Affairs, Melissa Mecham.

## **Non-Discrimination & Prohibition of Sexual Misconduct**

City University of Seattle adheres to all federal, state, and local civil rights laws prohibiting discrimination in employment and education. The University is committed to ensuring that the education environment is bounded by standards of mutual respect and safety and is free from discriminatory practices.

In the U.S., the University is required by Title IX of the Education Amendments of 1972 to ensure that all of its education programs and activities do not discriminate on the basis of sex/gender. Sex include sex, sex stereotypes, gender identity, gender expression, sexual orientation, and pregnancy or parenting status. Sexual harassment, sexual assault, dating and domestic violence, and stalking are forms of sex discrimination, which are prohibited under Title IX and by City University of Seattle policy. City University of Seattle also prohibits retaliation against any person opposing discrimination or participating in any discrimination investigation or complaint process internal or external to the institution. Questions regarding Title IX, including its application and/or concerns about noncompliance, should be directed to the Title IX Coordinator. For a complete copy of the policy or for more information, visit <https://my.cityu.edu/titleix> or contact the Title IX Coordinator.

In Canada, in compliance with the British Columbia Human Rights Code, the Alberta Human Rights Act, WorksafeBC, and the Workers' Compensation Board of Alberta, the University believes that its environment should at all times be supportive and respectful of the dignity and self-esteem of individuals. Discrimination, harassment and bullying conduct, whether through person to person behaviour or via electronic communications such as email or social media is not acceptable and will not be tolerated. As an educational institution, it is our responsibility to cultivate an environment of excellence, equity, mutual respect and to recognize the value and potential of every individual. The University will take all necessary steps to meet or exceed the requirements of the law to prevent discrimination, harassment and bullying. The Respectful Workplace Policy for the prevention of discrimination, harassment and bullying policy and procedure can be found at <https://www.cityu.edu/discover-cityu/about-cityu/> under the Policies section or at <https://www.cityuniversity.ca/about/>.

## **Title IX Statement**

City University of Seattle and its faculty are committed to supporting our students and seeking an environment that is free of bias, discrimination, and harassment. If students have encountered any form of sexual misconduct (e.g. sexual assault, sexual harassment, stalking, domestic or dating violence), we encourage them to report this to the University. If a student speaks with a faculty member about an incident of misconduct, that faculty member must notify CityU's Title IX coordinator and share the basic fact of the experience. The Title IX coordinator will then be available to assist students in understanding all of the options and in connecting students with all possible resources on and off campus.

To view CityU's sexual misconduct policy and for resources, please visit the [Title IX](#) and [Campus Safety](#) pages in the my.cityu.edu portal.

### **Religious Accommodations**

Washington state law requires that City University of Seattle develop a policy for accommodation of student absences or significant hardship due to reasons of faith or conscience, or for organized religious activities. The University's policy, including more information about how to request an accommodation, is available in the University Catalog. Accommodations must be requested within the first two weeks of this course using the Religious Accommodations Request Form found on the student dashboard in the my.cityu.edu student portal.

### **Academic Integrity**

Academic integrity in students requires the pursuit of scholarly activity that is free from fraud, deception and unauthorized collaboration with other individuals. Students are responsible for understanding CityU's policy on academic integrity and adhering to its standards in meeting all course requirements. A complete copy of this policy can be found in the [University Catalog](#) under *Student Rights and Responsibilities* on the page titled *Academic Integrity Policy*.

### **Attendance**

Students taking courses in any format at the University are expected to be diligent in their studies and to attend class regularly.

Regular class attendance is important in achieving learning outcomes in the course and may be a valid consideration in determining the final grade. For classes where a physical presence is required, a student has attended if they are present at any time during the class session. For online classes, a student has attended if they have posted or submitted an assignment. A complete copy of this policy can be in the [University Catalog](#) under *Student Rights and Responsibilities* on the page titled *Attendance*.

### **Final Assignments Due Date**

Final assignments for each class at CityU must be due on or before the final date of the course as indicated in the university's course information system. Due dates that extend beyond the final date of the course may negatively impact tuition funding for students.

## **Support Services**

### **Disability Services Accommodations Statement**

Students with a documented disability who wish to request academic accommodations are encouraged to contact Disability Support Services to discuss accommodation requests and eligibility requirements. Please contact Disability Support Services at [disability@cityu.edu](mailto:disability@cityu.edu) or 206.239.4752 or visit the [Disability Support Services](#) page in the my.cityu.edu portal.

Confidentiality will be observed in all inquiries. Once approved, information about academic accommodations will be shared with course instructors.

### **Library Services**

CityU librarians are available to help students find the resources and information they need to succeed in this course. Contact a CityU librarian through the [Ask a Librarian](#) service, or access [library resources and services online](#), 24 hours a day, seven days a week.

### **Smarthinking Tutoring**

CityU students have access to free online tutoring offered through Smarthinking, including writing support, from certified tutors 24 hours a day, seven days a week. Contact CityU's Student Support Center at [help@cityu.edu](mailto:help@cityu.edu) to request a user name and password.