



CIS*6670 Special Topics in Cybersecurity

Summer 2024

Section: 01

School of Computer Science

Credit Weight: 0.5

Course Details

Calendar Description

As published in the University of Guelph website

Course Description

This course explores essential issues in secure coding practices and application security within the context of the software development lifecycle (SDLC). It focuses on teaching students' necessary skills to design, develop, and maintain secure web applications and APIs. The course covers the latest strategies and techniques to counter prevalent security threats. Key topics include an in-depth and practical exploration of the Open Web Application Security Project (OWASP) Top 10, the most critical security risks to web applications, and the OWASP Software Assurance Maturity Model (SAMM) and Microsoft SDLC. Using a combination of theoretical knowledge and practical exercises, students will learn how to implement and test effective security measures from the ground up, ensuring the resilience of their applications against cyber threats and vulnerabilities.

Timetable

Tuesday 1pm – 4pm Room: 150 Research Lane

Final Exam

There is no final exam.

Instructional Support

Instructional Support Team

Instructor: Amin Azmoodeh

Email: aazmoode@uoguelph.ca

Office Hours: Please send email to book virtual office hour.

Learning Resources

Required Resources

Course Website (Website): <https://courselink.uoguelph.ca>

Course material, news, announcements, and grades will be regularly posted to the CIS*6670 CourseLink site. You are responsible for checking the site regularly.

Learning Outcomes

At the end of the course, students are expected to understand the following:

- Have comprehensive understanding of cybersecurity threats and the OWASP Top 10 vulnerabilities to identify and mitigate security risks in software applications. (L1)
- Develop proficiency in penetration testing and vulnerability assessment tools for practical security testing applications. (L2)
- Integrate security practices into DevOps and Secure DevOps, enhancing the security posture of development and operational workflows. (L3)
- Embed security considerations throughout the Secure Software Development Lifecycle (SSDLC) from design to maintenance. (L4)
- Apply the OWASP Software Assurance Maturity Model (SAMM) within organizational contexts for comprehensive software security assurance. (L5)
- Understand and apply compliance frameworks like NIST-800-218 (SSDF) for secure software development and compliance achievement. (L6)
- Understand role of Artificial Intelligence (AI) in modern software development and how AI integrates into software development. (L7)
- Navigate advanced vulnerabilities in AI-driven software development, using frameworks such as NIST AI and OWASP AI guidelines. (L8)
- Synthesize acquired knowledge and skills for practical application in real-world scenarios as well as theoretical aspects of secure software development. (L9)

Delivery method

In-person

Course Outline

- **Module 1: Introduction to the Application Security Program**
 - Overview of application security
 - Importance and benefits of an application security program
 - Key components of an application security program
 - Introduction to common security threats and mitigation strategies
 - **Module 2: OWASP TOP 10 Web Vulnerability**
 - Detailed exploration of the OWASP TOP 10 list
 - Case studies on each vulnerability
 - Prevention and mitigation techniques for each vulnerability
 - **Module 3: API Security**
 - Introduction to API and its importance in modern software architecture
 - Common security risks associated with APIs.
 - Best practices for securing APIs
 - Techniques for testing API security
 - **Module 4: DevOps and DevSecOps:**
 - Overview of DevOps principles
 - Introduction to DevSecOps and its importance
 - Integrating security at every phase of DevOps
 - Tools and practices for DevSecOps
 - **Module 5: Static and Dynamic Software Testing**
 - Explanation of static (SAST) vs. dynamic (DAST) testing methods
 - Tools and technologies for SAST and DAST
 - Best practices for implementing SAST and DAST in development workflows.
 - **Module 6: Secure Software Development Lifecycle and OWASP SAMM**
 - Secure Software Development Lifecycle (SSDLC) principles
 - Introduction to OWASP Software Assurance Maturity Model (SAMM)
 - Implementing SSDLC and SAMM in organizations
 - **Module 7: Integrating AI into Software Development and AI's Trustworthiness**
 - Role of AI in software development
 - Potential security risks with AI integration
 - Frameworks for ensuring AI trustworthiness and ethics.
 - **Module 8: Software Security Compliance and Standards:**
 - Overview of key software security standards
 - Implementing compliance measures in software development
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Assessments:

Marking Distributions

Title	Weight	Learning Outcome Alignment
Assignment 1	10%	L1, L2
Assignment 2	10%	L1, L2
Assignment 3	10%	L3
Assignment 4	10%	L4, L5, L6
Assignment 5	10%	L2, L7, L8
Presentation	20%	(L1, L2) or (L7, L8) or L3 or (L4, L5)
Essay	30%	L9

*To pass this course, students must submit the essay, presentation, and at least three of assignments.

Late Submission Policy

The penalty for late submissions is 20% of the total possible points deducted from the assignment score for each day it is late.

University Statement

Email Communication

As per university regulations, all students are required to check their <uoguelph.ca> e-mail account regularly: e-mail is the official route of communication between the University and its students.

When You Cannot Meet a Course Requirement

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons, please advise the course instructor (or designated person, such as a teaching assistant) in writing, with your name, id#, and e-mail contact. See the Undergraduate Calendar for information on regulations and procedures for [Academic Consideration](#).

Drop Date

Courses that are one semester long must be dropped by the end of the last day of classes; two-semester courses must be dropped by the last day of classes in the second semester. The regulations and procedures for [Dropping Courses](#) are available in the Undergraduate Calendar.

Copies of Out-Of-Class Assignments

Keep paper and/or other reliable back-up copies of all out-of-class assignments: you may be asked to resubmit work at any time.

Accessibility

The University promotes the full participation of students who experience disabilities in their academic programs. To that end, the provision of academic accommodation is a shared responsibility between the University and the student.

When accommodations are needed, the student is required to first register with Student Accessibility Services (SAS). Documentation to substantiate the existence of a disability is required, however, interim accommodations may be possible while that process is underway.

Accommodations are available for both permanent and temporary disabilities. It should be noted that common illnesses such as a cold or the flu do not constitute a disability.

Use of the SAS Exam Centre requires students to make a booking at least 14 days in advance, and no later than November 1 (fall), March 1 (winter) or July 1 (summer). Similarly, new or changed accommodations for online quizzes, tests and exams must be approved at least a week ahead of time.

More information: www.uoguelph.ca/sas

Academic Misconduct

The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community – faculty, staff, and students – to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection.

Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

The [Academic Misconduct Policy](#) is outlined in the Undergraduate Calendar.

Recording of Materials

Presentations which are made in relation to course work—including lectures—cannot be recorded or copied without the permission of the presenter, whether the instructor, a classmate or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

Resources

The [Academic Calendars](#) are the source of information about the University of Guelph's procedures, policies and regulations which apply to undergraduate, graduate and diploma programs.

Disclaimer

Please note that the ongoing COVID-19 pandemic may necessitate a revision of the format of course offerings, changes in classroom protocols, and academic schedules. Any such changes will be announced via Courselink and/or class email.

This includes on-campus scheduling during the semester, mid-terms and final examination schedules. All University-wide decisions will be posted on the COVID-19 website (<https://news.uoguelph.ca/2019-novel-coronavirus-information/>) and circulated by email.

Illness

Medical notes will not normally be required for singular instances of academic consideration, although students may be required to provide supporting documentation for multiple missed assessments or when involving a large part of a course (e.g., final exam or major assignment).

COVID-19 Safety Protocols

For information on current safety protocols, follow these links:

- <https://news.uoguelph.ca/return-to-campus/how-u-of-g-is-preparing-for-your-safe-return/>
- <https://news.uoguelph.ca/return-to-campus/spaces/#ClassroomSpaces>

Please note, that these guidelines may be updated as required in response to evolving University, Public Health or government directives.