

CIS*6540 - Advanced Penetration Testing and Exploit Development

Winter 2025 Course Outline

Section: 01

Credits: 0.50

Land Acknowledgement: Guelph

The University of Guelph resides on the ancestral lands of the Attawandaron people and the treaty lands and territory of the Mississaugas of the Credit. We recognize the significance of the Dish with One Spoon Covenant to this land and offer respect to our Anishinaabe, Haudenosaunee and Métis neighbours. Today, this gathering place is home to many First Nations, Inuit, and Métis peoples and acknowledging them reminds us of our important connection to this land where we work and learn.

Calendar Description

This course provides an in-depth understanding of techniques for detecting, responding to, and defeating Advanced Persistent Threats (APT) and malware campaigns using artificial intelligence and data mining techniques. Students will identify, extract, and leverage intelligence from different types of cyber threat actors.

Restriction(s): Restricted to Master of Cybersecurity and Threat Intelligence students.

Department(s): School of Computer Science

Course Description

Prerequisites: Computer Networks, Operating Systems, Web Programming, C Programming

Lecture Schedule

Th 9am-11:50am in TBA (1/6 to 4/21)

Location: 150 Research Lane

Instructor Information

Wenjing Zhang, Ph.D.

Assistant Professor

Email: wzhang25@uoguelph.ca

Office: 150 Research Lane

Office Hours:

Thursdays 11:50am-12:50pm

Learning Resources

Required Resources

Course material, lecture slides, news, announcements, and grades will be regularly posted to the CIS*6540 Website which can be found at counselink.uoguelph.ca. Use your gryphmail login/password to access the course webpage. You are responsible for checking the site regularly.

Textbook

No required textbook.

Other Resources

- Gray Hat Hacking: The Ethical Hacker's Handbook, 6th Edition by Harper et al., McGraw#Hill Education
- Web Application Security: Exploitation and Countermeasures for Modern Web Applications, by Andrew Hoffman, O'Reilly

Campus Resources

If you are concerned about any aspect of your academic program: Make an appointment with a Program Counsellor (<https://www.uoguelph.ca/uaic/programcounsellors/>) in your degree program. If you are struggling to succeed academically: There are numerous academic resources offered by the Learning Commons (<https://www.lib.uoguelph.ca/using-library/spaces/learning-commons/>) including, Supported Learning Groups for a variety of courses, workshops related to time management, taking multiple choice exams, and general study skills.

Cost of Textbooks and Learning Resources

Textbook / Learning Resource	Required / Recommended	Cost
None		0

Course Level Learning Outcomes

Upon successful completion of this course, students will be able to:

- Understand the fundamentals of Exploit Development
- Demonstrate knowledge in Penetration Testing techniques
- Conduct effective Reconnaissance to gather necessary information
- Perform Vulnerability Scanning to identify system weaknesses
- Utilize Sniffing tools for network analysis
- Execute Exploitation techniques to assess vulnerabilities
- Identify and perform Attacks on Authentication mechanisms
- Analyze and exploit Wired and Wireless Networks
- Recognize and utilize Web Exploits
- Apply Social Engineering strategies to test security awareness

Schedule of Topics and Assignments

Day	Date:	Topic	Activities	Due
Thu	1/9	Introduction to Exploit Development		
Thu	1/16	Introduction to Penetration Testing		
Thu	1/23	Reconnaissance, Vulnerability, Scanning		
Thu	1/30	Exploitation		
Thu	2/6	Post-Exploitation		
Thu	2/13	Password Attacks & Social Engineering		
Thu	2/20	Winter Break		
Thu	2/27	Attacks on Wired and Wireless Networks		
Thu	3/6	Web Exploits		
Thu	3/13	Web Exploits		
Thu	3/20	Web API Penetration Testing		
Thu	3/27	Web API Penetration Testing		
Thu	4/3	Final Exam		

Assessment Breakdown

- Lab Assignment and Follow-up Quizzes (60%)
- Final Exam (40%)

Last Day to Drop Course

The final day to drop Winter 2025 courses without academic penalty is the last day of classes: April 04

After this date, a mark will be recorded, whether course work is completed or not (a zero is assigned for missed tests/assignments). This mark will show on the student's transcript and will be calculated into their average.

Course Grading Policies

Reappraisal Policy

If you have an assignment that you would like to have reappraised, please follow the instructions given on CourseLink to submit your request. If you have an exam that you would like to have reappraised, please provide the course instructors with a written request on paper and your exam. In either case, include a justification for your claims. The appeals deadline is one week after the respective graded item is first made available. Note that for an exam the entire exam will be remarked, and the assigned grade may go up or down as a result. If your appeal is concerned with a simple calculation error, please see the instructor during their office hours.

Late Submission

Assignments must be submitted by their respective due dates. Any late submissions will incur a penalty of 10% of the total grade for each day they are delayed. Please note that submissions will not be accepted if they are more than 2 days late, except in cases where prior arrangements have been made with the instructor.

Standard Statements for Graduate Courses

Academic Integrity

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 (<https://calendar.uoguelph.ca/graduate-calendar/general-regulations/academic-misconduct/>) is outlined in the Graduate Calendar.

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.

Use of the SAS Exam Centre requires students to make a booking at least 10 business days in advance, and no later than the first business day in November, March or July as appropriate for the semester. Similarly, new or changed accommodations for online quizzes, tests and exams must be approved at least a week ahead of time. For students at the Guelph campus, information can be found on the SAS website. (<https://www.uoguelph.ca/sas/>)

Accommodation of Religious Obligations

If you are unable to meet an in-course requirement due to religious obligations, please email the course instructor within two weeks of the start of the semester to make alternate arrangements.

See the Academic calendar for information on regulations and procedures for Academic Accommodation of Religious Obligations (<https://calendar.uoguelph.ca/graduate-calendar/general-regulations/academic-accommodation-religious-obligations/>)

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.

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 (<https://calendar.uoguelph.ca/graduate-calendar/general-regulations/registration/>) dropping courses are available in the Graduate Calendar (<https://calendar.uoguelph.ca/graduate-calendar/general-regulations/registration/>).

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.

Health and Wellbeing

The University of Guelph provides a wide range of health and wellbeing services at the Vaccarino Centre for Student Wellness (<https://wellness.uoguelph.ca/>). If you are concerned about your mental health and not sure where to start, connect with a Student Wellness Navigator (<https://wellness.uoguelph.ca/navigators/>) who can help develop a plan to manage and support your mental health or check out our mental wellbeing resources. (<https://wellness.uoguelph.ca/shine-this-year/>) The Student Wellness team are here to help and welcome the opportunity to connect with you.

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).

Recording of Materials

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

Resources

The Academic Calendars (<http://www.uoguelph.ca/registrar/calendars/?index>) are the source of information about the University of Guelph's procedures, policies and regulations which apply to undergraduate, graduate and diploma programs.

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 Graduate Calendar for information on regulations and procedures for Academic Consideration (<https://calendar.uoguelph.ca/graduate-calendar/general-regulations/grounds-academic-consideration/>).