

# Cybersecurity and Defense in Depth

CIS\*6510, Winter 24

## 1. INSTRUCTOR INFO

Instructor: Fatemeh Khoda Parast

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## 2. AIMS & OBJECTIVES

This course explores principles and technical strategies for enforcing security policies, safeguarding networks, and protecting systems against malicious activities. Students will learn to architect a secure system and implement ethical practices to secure networks.

### 2.1. Course Description

This course comprehensively explores concepts and technical measures to enforce security policies and safeguard networks and systems against malicious activities. The curriculum delves into defence mechanisms across the data, system, network, and perimeter layers, examining how these techniques can be orchestrated to form a defence-in-depth strategy. Additionally, students will gain insights into ethical system engineering and the application of security measures such as Firewalls, IDS, IPS, proxies, and more to secure networks effectively.

## 2.2. Learning Outcomes

Upon successful completion of this course, students will have demonstrated proficiency in the following:

- Crafting and implementing robust, multi-layered defence systems to ensure comprehensive security.
- Recognizing common security vulnerabilities and potential pitfalls in system design and proposing preventive measures to mitigate risks.
- Applying cybersecurity concepts and controls adeptly to analyze threats, safeguard data, and fortify systems against potential breaches.
- Assessing and interpreting pertinent facts, concepts, principles, and theories related to the design and development of secure systems, utilizing this knowledge to evaluate and enhance the security of real-world scenarios.
- Integrating cybersecurity strategies into ethical considerations, regulatory compliance, and industry best practices.
- Collaborating effectively within teams to conduct research and articulate logical and well-founded arguments using appropriate methodologies.

## 3. INSTRUCTOR’S ROLE AND RESPONSIBILITIES

The role of the instructor is to deliver lectures, facilitate discussion, provide guidance for the course project, and provide feedback to students.

## 4. TEACHING AND LEARNING ACTIVITIES

Lectures: 3 hours per week

### Timetable

Week	Date	Topic
Week 1	8-Jan	Security Concepts and Principals
Week 2	15-Jan	Fundamentals of Cryptography

Week 3	22-Jan	User Authentication, Authentication Protocols, and Key Establishment
Week 4	29-Jan	Operating System Security and Access Control
Week 5	5-Feb	Operating System Security and Access Control
Week 6	12-Feb	Software Security
Week 7	19-Feb	READING WEEK NO CLASS
Week 8	26-Feb	MIDTERM EXAM
Week 9	4-Mar	Malicious Software
Week 10	11-Mar	Network Security, Web Applications Security
Week 11	18-Mar	Firewalls and Tunnels
Week 12	25-Mar	Intrusion Detection and Network-Based Attacks
Week 13	1-Apr	FINAL EVALUATION

## 5. LEARNING RESOURCES

Computer Security and the Internet: Tools and Jewels Preprint Edition (available online for free), Paul C. van Oorschot. (2019).

## 6. COURSE POLICIES

- To complete the course, students must achieve at least 65% of the total marks.
- Missing up to two deliverables, such as assignments or quizzes, is permissible due to valid reasons, such as illness. Exceeding this limit will lead to course failure.
- All communication should be directed through the course TA. In cases where the TA cannot address a particular request, it will be forwarded to the instructor by the TA.

## 7. ASSESSMENTS

## 7.1. Assessment Date Details

Item	Date	Mark
Quiz	29-Jan, 12-Feb, 11-Mar, 25-Mar	20%
Assignment	22-Jan, 5-Feb, 4-Mar, 18-Mar	20%
Midterm exam	26-Feb	25%
Final Evaluation	1-Apr	35%

## 7.2. Assessments Description

- **Quiz:** In this module, students should expect questions from previous session topics.
- **Assignment:** This module evaluates the practical aspect of the course through projects.
- **Midterm:** Evaluate all content of the course up to the midterm examination.
- **Final Evaluation:** Evaluate all content of the course.

# 8. UNIVERSITY STATEMENTS

## 8.1. Email Communication

As per university regulations, all students must check their e-mail accounts regularly; e-mail is the official communication route between the University and its students.

## 8.2. When You Cannot Meet a Course Requirement

When you cannot meet an in-course requirement because of illness or compassionate reasons, please advise the course instructor (or a designated person, such as a teaching assistant) in writing with your name, ID #, and e-mail contact. The grounds for Academic Consideration are detailed in the Graduate Calendar: <https://www.uoguelph.ca/registrar/calendars/graduate/current/index.shtml>.

## 8.3. Drop Date

One semester-long course must be dropped by the end of the fortieth class day; two-

semester courses must be dropped by the second semester's last day of the add period. The regulations and procedures for changing graduate course registration are available in the Graduate Calendar.

#### 8.4. Copies of Out-of-class Assignments

Keep paper and/or other reliable backup copies of all out-of-class assignments; you may be asked to resubmit work anytime.

#### 8.5. Accessibility

The University promotes the full participation of students who experience disabilities in their academic programs. To that end, providing 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 book their exams at least seven days in advance and not later than the fortieth-class day. More information can be found on the SAS website: <https://www.uoguelph.ca/sas>.

#### 8.6. 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. The 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 to 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 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 detailed in the Graduate Calendar: [https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/sec\\_d0e2642.shtml](https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/sec_d0e2642.shtml).

## 8.7. Recording of Materials

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

## 8.8. Resources

The Academic Calendars are the source of information about the University of Guelph's procedures, policies, and regulations that apply to undergraduate, graduate, and diploma programs: <https://www.uoguelph.ca/academics/calendars>.