# THE UNIVERSITY OF WINNIPEG

## APPLIED COMPUTER SCIENCE

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| Course Number: | GACS-7104-001 |
| Course Name: | Theory and Practice of Security and Privacy |
| Course Webpage: | Nexus (https://nexus.uwinnipeg.ca/d2l/home/54817) |

## Instructor Information

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| **Instructor:** | Dr. Mary Adedayo | | |
| **E-mail:** | m.adedayo@uwinnipeg.ca | | |
| **Office Hours:** | Fridays | 12:30 pm – 1:30 pm | 3D19 |
| | | | |
| **Class meeting time**: | Mondays/Wednesdays | 10:00 am – 11:15 am | 3D03 |

## Important Dates

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| 1. First Class: | | Wednesday, September 6, 2023 |
| 2. Pre-recorded lectures (no in-person lectures)*: | | Monday, September 25, 2023<br>Wednesday, September 27, 2023<br>Monday, October 2, 2023 |
| 3. Final day for project selection: | | Monday, October 9, 2023 |
| 4. Reading Week (no classes): | | October 8 – 14, 2023 |
| 5. Midterm Test: | | Monday, October 30, 2023 |
| 6. Final Withdrawal Date w/o academic penalty**: | | Monday, November 13, 2023 |
| 7. Last Class: | | Monday, December 4, 2023 |
| 8. Project presentation (tentative): | | Thursday, December 7, 2023 |
| 9. Submission of final project paper: | | Wednesday, December 13, 2023 |
| 10. University closures: | Truth and Reconciliation Day | Saturday, September 30, 2023 |
| | Thanksgiving Day | Monday, October 9, 2023 |
| | Remembrance Day | Saturday, November 11, 2023 |

*There will be no in-person lecture on these dates. The lectures will be delivered via pre-recorded videos on Nexus. Students are responsible for watching recorded lectures before the next class.

**A minimum of 20% of the work on which the final grade is based will be evaluated and available to the student before the voluntary withdrawal date.

## Course Objectives / Learning Outcomes

This course focuses on security and privacy from a digital forensics' perspective. It introduces the theory of digital forensics and provides a practical introduction to conducting digital investigations addressing various types of cyber threats. Students will learn about the key digital forensics processes such as evidence collection, preservation, examination, analysis, and reporting, and work with different tools used for these processes.

The objective of this course is to introduce students to digital forensics from both theoretical and practical perspectives. The goal of the lecture will be: 1) to discuss different underlying concepts on which digital forensics tools are based and the theory of conducting investigations; 2) to provide an introduction into how digital forensics tools are used in achieving the aim of each phase of the digital forensics process. Students will have the opportunity to work on case scenarios to consolidate their understanding.

## Evaluation Criteria

1. Assignments (30%)
   - 6 – 8 mini assignments, equally weighted.
   - Individual due dates will be posted on Nexus.
   - Assignments will be accepted up to 1 day late with a 20% penalty.

   Course tool:
   Students may be required to use virtualization software (e.g. VirtualBox) and a variety of open-source digital forensics tools. It is recommended that students have a computer on which virtualization software can be installed.

   Assignment submissions:
   All work is to be submitted electronically via Nexus, except otherwise stated. Further details and submission procedure will be stated in each assignment.

   *Students are responsible for backing up and protecting their lab and assignment work.*

2. Midterm Tests (25%)
   - During the regular class time (see Important Dates).

3. Final Exam (45%)
   - The final exam will be replaced by a project.
   - Project details will be provided in class. The purpose of the project is to make students familiar with different domains of digital forensics. The project includes choosing a problem in any subdomain of digital forensics, searching and reading related articles on the topic, implementing a solution or providing an algorithm, and writing an 8 to 10-page report (IEEE format).
   - An approved project topic must be selected by October 9.
   - Final projects will be presented in a 30-minute presentation on December 7.
   - Final project papers must be submitted by December 13.
   - A project will be evaluated by its originality and novelty (16/45), technical soundness and completeness of the solution (16/45), readability and organization of the typed report (8/45), and presentation (5/45).
   - Selected project(s) may be completed in pairs rather than individually. The evaluation in this case will also be subject to the peer's evaluation (up to 3%).

## Test / Exam Requirements

- Photo ID is required for the midterm and final exams.
- The use of computers, calculators, phones, or other electronic devices is not permitted during exams.
- Midterm and final exams are closed-book.

*Students should contact the instructor as soon as possible* if extenuating circumstances require missing a lab, assignment, test, or examination. A medical certificate from a practicing physician may be required before any adjustments or makeup exams are considered.

Students with documented disabilities, temporary or chronic medical conditions, requiring academic accommodations for tests/exams (e.g., private space) or during lectures/laboratories (e.g., note-takers) are encouraged to contact Accessibility Services (AS) at 204-786-9771 or accessibilityservices@uwinnipeg.ca to discuss appropriate options. All information about a student's disability or medical condition remains confidential.
https://www.uwinnipeg.ca/accessibility-services.

Students may choose not to attend classes or write examinations on holy days of their religion, but they must notify their instructors at least two weeks in advance. Instructors will then provide opportunity for students to make up work examinations without penalty. A list of religious holidays can be found in the 2019-20 Undergraduate Academic Calendar online at
http://uwinnipeg.ca/academics/calendar/docs/important-notes.pdf

## Final Letter Grade Assignment

Historically, numerical percentages have been converted to letter grades using the following scale. However, instructors can deviate from these values based on the pedagogical nuances of a particular class, and final grades are subject to approval by the Department Review Committee.

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| A+ | 90 – 100% | B+ | 75 – 79% | C | 60 – 64% |
| A | 85 – 89 % | B | 70 – 74% | D | 50 – 59% |
| A- | 80 – 84% | C+ | 65 – 69% | F | below 50% |

## Required Textbook / Reading List

- Bill Nelson, Amelia Phillips, and Christopher Steuart, *Guide to Computer Forensics and Investigations, 6th ed.,* Cengage. 2018. ISBN: 9781337568944
  (Library Call number: *HV8079.C65 N45 2019*)
- Class Notes/slides and assigned papers will be available on Nexus.

## Optional Textbooks

- Marjie Britz, *Computer Forensics and Cyber Crime, 3rd ed.,* Pearson. 2013. ISBN: 9780132677714 (Library Call number: *QA76.9.A25 B75 2013*)

- Darren Hayes, *A Practical Guide to Digital Forensics Investigations, 2nd ed.,* Pearson. 2020. ISBN: 9780789759917 (Library Call number: *HV8079.C65 H39 2021*)
- Aaron Walters, Jamie Levy, Andrew Case, and Michael Hale Ligh, *The Art of Memory Forensics: Detecting Malware and Threats in Windows, Linux, and Mac Memory, 1st ed.,* John Wiley & Sons, Incorporated. 2014. ISBN: 9781118825099
- Brian Carrier, *File System Forensic Analysis, 1st ed.,* Addison-Wesley Professional. 2005. ISBN: 9780321268174

**Note**: It is recommended that you get a copy of the required textbook. However, a print copy of the required textbook and the first two optional textbooks are available on Reserve at the library. You need the book's call number to pick up print reserves at the Circulation desk in the library. Print reserves cannot be placed on hold or renewed. Once a print reserve is returned, students must wait 30 minutes before they can borrow it again, to ensure everyone has fair access to the material. Electronic versions of other books may be accessed through the library.

## Prerequisite Information

- This course requires a basic understanding of computer security, computer architecture, and some knowledge of using Linux/Unix commands.
- Consent of the Department Graduate Program Committee Chair and Instructor is required.

## Regulations, Policies, and Academic Integrity

Students are encouraged to familiarize themselves with the Academic Regulations and Policies found in the University Academic Calendar at:
https://uwinnipeg.ca/academics/calendar/docs/regulationsandpolicies.pdf

Particular attention should be given to subsections 8 (Student Discipline), 9 (Senate Appeals), and 10 (Grade Appeals).

***Avoiding Academic Misconduct:*** Academic dishonesty is a very serious offense and will be dealt with in accordance with the University's policies.

Detailed information can be found at the following:

- Academic Misconduct Policy and Procedures: https://www.uwinnipeg.ca/institutional-analysis/docs/policies/academic-misconduct-policy.pdf and https://www.uwinnipeg.ca/institutional-analysis/docs/policies/academic-misconduct-procedures.pdf
- About Academic Integrity and Misconduct, Resources, and FAQs: https://library.uwinnipeg.ca/use-the-library/help-with-research/academic-integrity.html

Uploading essays and other assignments to essay vendors or trader sites (filesharing sites that are known providers of essays for use by others who submit them to instructors as their own work) involves “aiding and abetting” plagiarism. Students who do this can be charged with Academic Misconduct.

***Academic Integrity and AI Text-generating Tools:*** Students must follow principles of academic integrity (e.g., honesty, respect, fairness, and responsibility) in their use of material obtained through AI text-generating tools (e.g., ChatGPT, Bing, Notion AI). If an instructor prohibits the use of AI tools in a course, students may face an allegation of academic misconduct if using them to do assignments. If AI tools are permitted, students must cite them. According to the MLA (https://style.mla.org/citing-generative-ai/), writers should

- cite a generative AI tool whenever you paraphrase, quote, or incorporate into your own work any content (whether text, image, data, or other) that was created by it
- acknowledge all functional uses of the tool (like editing your prose or translating words) in a note, your text, or another suitable location
- take care to vet the secondary sources it cites

If students are not sure whether or not they can use AI tools, they should ask their professors.

***Non-academic misconduct:*** Students are expected to conduct themselves in a respectful manner on campus and in the learning environment irrespective of the platform being used. Behaviour, communication, or acts that are inconsistent with a number of UW policies could be considered “non-academic” misconduct. More detailed information can be found here:

- Respectful Working and Learning Environment Policy https://www.uwinnipeg.ca/respect/respect-policy.html,
- Acceptable Use of Information Technology Policy https://www.uwinnipeg.ca/institutional-analysis/docs/policies/acceptable-use-of-information-technology-policy.pdf
- Non-Academic Misconduct Policy and Procedures: https://www.uwinnipeg.ca/institutional-analysis/docs/student-non-academic-misconduct-policy.pdf and https://www.uwinnipeg.ca/institutional-analysis/docs/student-non-academic-misconduct-procedures.pdf.

***Copyright and Intellectual Property:*** Course materials are the property of the instructor who developed them. Examples of such materials are course outlines, assignment descriptions, lecture notes, test questions, and presentation slides—irrespective of format. Students who upload these materials to filesharing sites, or in any other way share these materials with others outside the class without prior permission of the instructor/presenter, are in violation of copyright law and University policy. Students must also seek prior permission from the instructor/presenter before, for example, photographing, recording, or taking screenshots of slides, presentations, lectures, and notes on the board. Students found to be in violation of an instructor’s intellectual property rights could face serious consequences pursuant to the Academic Misconduct or Non-Academic Misconduct Policy; such consequences could possibly involve legal sanction under the Copyright Policy: https://copyright.uwinnipeg.ca/basics/copyright-policy.html

## Privacy

Students have rights in relation to the collecting of personal data from the University of Winnipeg

- Student Privacy: https://www.uwinnipeg.ca/privacy/admissions-privacy-notice.html
- Zoom Privacy: https://www.uwinnipeg.ca/privacy/zoom-privacy-notice.html

## Class Cancellation, Correspondence with Students, and Withdrawing from Course

When it is necessary to cancel a class due to exceptional circumstances, the course instructor will make every effort to inform students via UWinnipeg email and Nexus. Emails to the instructor must be sent to the direct UWinnipeg email address (not via the Nexus messaging tool).

Students are reminded that they have a responsibility to regularly check their UWinnipeg e-mail addresses to ensure timely receipt of correspondence from the University and/or the course instructor**.**

Please let the course instructor know if you plan on withdrawing from the course. Note that withdrawing before the VW date does not necessarily result in a fee refund.

## Topics to be covered (tentative)

1. Fundamentals of digital forensics and computer security
2. Electronic data acquisition
3. Processing digital crime and incident scene
4. Understanding file systems
5. Digital forensics tools
6. Networks forensics and live acquisition
7. Mobile device forensics
8. Digital forensics reporting
9. Recovering graphic files (time permitting)
10. Database forensics (time permitting)
11. Cloud forensics (time permitting)

*The topics listed are tentative and may be covered in a different order.*

*Note: A permitted or necessary change in the mode of delivery may require adjustments to important aspects of course outlines, like class schedule and the number, nature, and weighting of assignments and/or exams.*