THE UNIVERSITY OF WINNIPEG

APPLIED COMPUTER SCIENCE

Course Number:	GACS-7307-001
Course Name:	Advanced Concepts in Cloud Computing
Course Webpage:	https://nexus.uwinnipeg.ca/d2l/home/75109

Instructor Information

Professor: Yaser Al Mtawa **Office:** 3D06B
E-mail: y.almtawa@uwinnipeg.ca **Office Hours**: Wednesday, 11:00 am – 12:00 pm
Class Meeting Time: Friday 10:00 AM - 1:00 PM (Centennial Hall, 3C13 Lecture)

Important Dates

First Class:		January 9, 2026
Proposal Submission:		January 23, 2026
Reading Week (No Classes):		February 15 – 21, 2026
Midterm Exam:		March 6, 2026
Final Withdrawal Date w/o academic penalty:		Friday, March 13, 2026*
Last Class:		Monday, April 6, 2026**
Submission of term papers:		April 12, 2026
University closures:	Louis Riel Day	Monday, February 16, 2026
	Good Friday	Friday, April 3, 2026

*(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)
**The make-up day for Good Friday is April 6.

Course Objectives/Learning Outcomes

This course provides extensive coverage of major subjects in Cloud Computing. It gives an overview of Cloud Computing and explains its main service delivery models, deployment architectures, and key enabling technologies and mechanisms such as virtualization, parallel computing, and BigData analytics. Students will acquire considerable knowledge in Cloud data and resource management, architectural design patterns, security and privacy challenges and solutions, as well as commercial and open-source Cloud systems. Other topics that are covered

include application migration to the Cloud, interoperability issues, Quality of Service (QoS) and Service Level Agreement (SLA). Students will also gain critical research skills by taking on a research project in a subject related to Cloud Computing.

Evaluation Criteria

Midterm Exam (27%)

- The Midterm Exam will cover specific course materials, which will be provided to the students in class.

Class Participation (3%)

- Participation is essential for deepening learning through engagement, collaboration, and critical analysis. It will be evaluated based on preparation, active engagement, the quality of contributions, consistent participation, and respectful discourse. Note that attendance alone or frequent comments that do not advance the discussion are insufficient for high-quality participation.

Reading Activity and Class Presentation (5%)

- Students are required to study a scientific research paper in the area of Cloud Computing (given by the instructor) and present it in class during the term.
- Details about the presentation requirements will be communicated to the students in class.

Term Project

Project Proposal (5%)

- The project proposal is a preliminary plan for your term project. It should outline your intended approach, which may involve a comparative study, tool evaluation, or case study analysis. This initial proposal is not final; it will undergo iterative refinement throughout the course as your project evolves. Detailed guidelines will be provided in class.

Final Project (60%)

- The research project in this course will involve Cloud Computing applications, resource management, and security.
- Your project should present a new idea that could be theoretical or technical. You can refer to conferences and journals in computer science and engineering to find potential research topics.
- The project may lead to the publication of a scientific paper with instructor approval.
- Depending on class size, students may work in groups, with individual contributions evaluated.
- Proposals must be submitted as PDF files via Nexus no later than 11:59 pm on the due date. Proposals are limited to two pages, including an introduction, related work in the literature, research objectives, and methodology. Typed proposals only.

- Research projects are evaluated based on originality, technical soundness, realization of objectives, and quality of presentation. Group projects will have additional evaluation criteria.
- The final research paper must be a scientific publication of six to nine pages in two columns and 10-point font. Papers must be typed and formatted using a word processor or a Latex editor.
- The final research paper must be submitted as a PDF file via Nexus no later than 11:59:59 pm on the due date.
- Students are required to present their projects in class at the end of the term.
- Students can refer to the following conferences and journals for potential research topics:
    - IEEE CloudNet https://cloudnet2024.ieee-cloudnet.org/authors/call-papers
    - IEEE CloudCom http://www.cloudcom2025.org/cfp
    - SmartCloud https://cloud-conf.net/smartcloud/2025/cfp.html
    - FiCloud https://www.ficloud.org/2025/cfp.php
    - IEEE Transactions on Cloud Computing
    - Springer Journal of Cloud Computing https://journalofcloudcomputing.springeropen.com/articles

Test / Exam Requirements

- Photo ID is required for exams.
- The use of all personal electronic devices (including but not limited to computers, calculators, phones, and tablets) is prohibited during exams unless explicitly authorized by the instructor.
- Exams are closed-book unless explicitly authorized by the instructor.

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 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 2025-26 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 pedagogical nuances of a particular class, and final grades are subject to approval by the Department Review Committee.

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

NOTE: Final grades require departmental/program approval and may be subject to change.

Required TextBook(s)/Reading List

There is no required textbook for this course. However, the following book maybe used partially:

Cloud Computing: Concepts, Technology, Security, and Architecture. 2nd ed., 2023
Authors: Thomas Erl and Eric Barceló Monroy
Publisher: Pearson
ISBN-13: 978-0138052256

Supplementary materials, including scientific articles and notes, will be available on the course website. Students are responsible for all content presented during lectures, posted online, and communicated through in-class announcements.

Prerequisite and Restriction Information

- Consent of Department Graduate Studies Committee Chair (or research supervisor)
- Students need to have some knowledge of linear algebra and calculus to take the course.

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 in accordance with the University's policies.

Detailed information can be found at the following:

- Academic Misconduct Policy and Procedures: https://www.uwinnipeg.ca/policies/docs/policies/academic-misconduct-policy.pdf and https://www.uwinnipeg.ca/policies/docs/procedures/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 vendor 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 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/policies/docs/policies/acceptable-use-of-information-technology-policy.pdf
- Non-Academic Misconduct Policy and Procedures: https://www.uwinnipeg.ca/policies/docs/policies/student-non-academic-

misconduct-policy.pdf and https://www.uwinnipeg.ca/policies/docs/procedures/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 of 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 of the collecting of personal data the University of Winnipeg

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

Class Cancellation, Students Correspondence, 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.
- 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.
  - It is recommended that electronic communication used for the course utilize a UofW email account or the Nexus platform to minimize the risk of filtering. Use 'GACS-7307' as subject in email communication.
- Please let 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.
- Should it become necessary to change the course delivery mode to hybrid or asynchronous delivery, the instructor will notify students promptly through both an in-class announcement and an official notice on Nexus.

Student Wellness

The University of Winnipeg affirms the importance of student mental health and our commitment to providing accessible, culturally appropriate, and effective services for students. Students who are seeking mental health supports are encouraged to reach out to the Wellness Centre at studentwellness@uwinnipeg.ca or 204-258-3809. For community-based mental health resources and supports, students are encouraged to dial 2-1-1. This program of United Way is available 24/7 in 150 languages. Other resources and contact information can be found at the following link: https://www.uwinnipeg.ca/student-wellness/contact-us.html.

Sexual Violence and Human Rights Advisor (SVHRA)

Students who have experienced Sexual Violence can access support from the SVHRA. The SVHRA receives disclosures and can support students with on and off-campus reporting. In collaboration with the Sexual Violence Response Team (SVRT), the SVHRA also provides fast-track referrals to Student Wellness, academic accommodations, security support, and other on and off campus supports. The SVHRA and SVRT operate within a confidential, survivor-centered, and trauma-informed framework. https://www.uwinnipeg.ca/respect/sexual-violence/

Disclosures may be made in-person, email, by text, by phone, or Zoom/Teams.

5Ri55, 5th Floor (Rice Centre)
204.230.6660 – *call or text (confidential line)*
svrt@uwinnipeg.ca

Course Outline (Tentative)

1- Overview of Cloud Computing and Service Delivery Models
2- Service-Oriented Architectures, Cloud Federation, and web-service composition
3- System and Network Virtualization
4- Cloud Resource Allocation and Management
5- Cloud Data Management: Storage and Analytics (MapReduce/Hadoop)
6- Cloud Architecture Design Patterns
7- Cloud Security and Privacy
8- Mobile Computing, Fog, and Internet of Things (IoT)
9- Research Trends in Cloud Computing

Note that all topics listed may not be covered and may be offered in a slightly different time order.