The University of Western Ontario
London, Ontario, Canada
Department of Computer Science

CS 4481a/9628a - Image Compression
Course Outline - Fall (September -- December) 2025

This course uses the Online Western's Learning (OWL) system (https://westernu.brightspace.com)

A: Instructor

- Professor Mahmoud El-Sakka
  ███████████████
  Email: elsakka <at> csd.uwo.ca
  Office hours: ████████████████████
  Office hours: ████████████████████

B: Graduate Teaching Assistant

TBA

Teaching Assistant's Office hours: By appointment only (AFTER MARKING ASSIGNMENTS)

C: Lectures

- Time: Wednesday 10:30 am - 1:30 pm
- ████████████

D: Course Description

It is widely believed that a picture is worth more than a thousand words. However, dealing with digital pictures (images) requires far more computer memory and transmission time than that needed for plain text.

To be able to efficiently handle the huge amount of data associated with images, compression schemes are needed. Image compression is a process intended to yield a compact representation of an image, hence, reducing the image storage/transmission requirements.

Over the last few decades, many good image compression schemes have been developed. These schemes are currently used in commercial compression products/systems, e.g., JPEG and GIF. The performance of these schemes varies from low to high compression ratios with low to high levels of degradation of the decompressed images.

This course provides students with a solid understanding of the fundamentals and the principles of various digital still-image compression schemes.

Upon completion of the course, the students will be equipped with the fundamental knowledge that will help them understand various compression techniques in such a way to optimize their use for a particular application.

E: Topics To Be Covered During The Course

The course will address as many of the following topics as time will allow:

- Digital Image Fundamentals
- Introduction to Image Compression
- Codeword Encoding
- Dictionary-based Encoding
- Predictive Encoding
- Tree-based Encoding
- Quantization
- Transform Encoding
- Continuous-tone Still-image Compression Standard
- Additional topics, if time allows

F: Prerequisites

Either

- CS3305a/b (Operating Systems),
- CS3307a/b (Object-Oriented Design and Analysis), or
- CS3342a/b (Organization of Programming Languages)

As well as having good comments in C programming

Unless you have either the prerequisites for this course or written special permission from the Department of Computer Science to enroll in it, you may be removed and withdrawn from this course in accordance with university policy. This may be done after the add/drop deadline of the academic term, and the course will be marked as withdrawn (WDN) on your academic record. This decision may not be appealed.

G: Textbook

Introduction to Data Compression, 5th Edition
By Khalid Sayood
Elsevier/Morgan Kaufmann, 2017.

H: Course Website

The CS 4481a course uses the Online Western's Learning (OWL) system (https://westernu.brightspace.com)

Class information and course material will be posted on this website, including lecture notes and assignments. Students should check OWL (https://westernu.brightspace.com) on a regular basis for news and updates. This is the primary method by which information will be disseminated to all students in the class. Students are responsible for checking OWL on a regular basis.

Forums for the CS4481a will be maintained at the course OWL site, where the instructor will reply to these forum posts.

If students need OWL-related assistance, they can seek support on the OWL Help page. Alternatively, they can contact the Western Technology Services Helpdesk. They can be reached by phone at 519-661-3800 or ext. 83800.

I: Material Accessibility Statement

Please contact the course instructor if you require material in an alternate format or if you require any other arrangements to make this course more accessible to you. You may also wish to contact Accessible Education--formerly SSD--(http://academicsupport.uwo.ca/accessible_education/index.html) at 661-2111 x82147 for any specific question regarding an accommodation.

J: Email Contact

In accordance with policy, http://www.uwo.ca/its/identity/activatenonstudent.html, the centrally administered email account provided to students will be considered the individual's official university email address. It is the responsibility of the account holder to ensure that the email received from the University at their official university address is attended to in a timely manner.

Losing emails is not an acceptable excuse for not knowing about the information that was sent.

K: Assignment Conduct

- There will be 4 equal weight assignments:

- Tentative assignments schedule:

Assignment no.	To be posted on	Back after	Due on
1	Wednesday September 24	15 days	Thursday October 9
2	Wednesday October 8	15 days	Thursday October 23
3	Wednesday October 22	22 days	Thursday November 13
4	Wednesday November 12	15 days	Thursday November 27

- Assignments are due 5 minutes before the midnight (23:55) of the due date.

- Assignment descriptions will be posted on the course website by the dates listed above.

- Any changes, updates, and clarifications to assignments will also be posted on the website. It is your responsibility to monitor these pages closely.

- It is your responsibility to keep up-to-date backups of assignment disk files in case of system crashes or inadvertently erased files. Retain disk copies of all material handed in, as well as the actual graded assignment, to guard against the possibility of lost assignments or errors in recording marks. You should keep these materials at least until you are satisfied that your final mark for the course has been computed properly.

- All submissions will be submitted electronically. Details will be given in the assignment descriptions. We reserve the right to use similarity detection software to detect possible cheating cases.

- Late assignments:
  - Assignments can be submitted late (without a late penalty) up to 24 hours after the due date/time **(built-in submission deadline flexibility)**
  - After 24 hours from the due date/time, late assignments will receive a zero grade.

- Every effort will be made to have assignments marked and handed back within 3 weeks after the hand-in date, preferably sooner.

- When assignment marking has been completed, you will be informed via the course website and/or email.

- A request for an adjustment in an assignment mark must be made within 2 weeks following the first handed-back day. All assignment marks are considered final after that date.

L: Quiz Conduct

- There will be 10 equal weight in-class quizzes:

- Tentative quizzes schedule:

Quiz no.	date
1	Wednesday September 24
2	Wednesday October 01
3	Wednesday October 08
4	Wednesday October 15
5	Wednesday October 22
6	Wednesday October 29
7	Wednesday November 12
8	Wednesday November 19
9	Wednesday November 26
10	Wednesday December 03

M: In class Seminar/Presentation (For graduate students only)

Each graduate student will present an in-class seminar/presentation on an Image Compression related topic. Seminar topics must first be discussed with, and approved by, the instructor.

N: Ethical Conduct

Scholastic offences are taken seriously, and students are strongly encouraged to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following Web site: http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf.

Students may discuss approaches to problems; however, the actual details of the work (assignment coding, answers to concept questions, etc.) must be an individual effort.

Your assignment solutions must be 100% your own individual work, not the products of a group effort. **Students cannot copy parts or the whole program from any online resources (e.g., generative AI or any online help) or others. Violating this instruction will be considered an academic offence and will be prosecuted.**

Submissions judged to be the result of academic dishonesty may be directed to the department's Integrity Committee. The committee will assess the case and apply an appropriate disciplinary penalty, including reporting the case to the dean's office.

Computer-marked multiple-choice tests and/or exams may be subject to submission for similarity review by software that will check for unusual coincidences in answer patterns that may indicate cheating.

Students are responsible for reading and respecting the Computer Science Department's policy on Scholastic Offences and Rules of Ethical Conduct.

O: Exam Schedule

- There will be no midterm or final exams in this course.

P: Methods of Evaluation

- Grades will be based on
    - Quizzes worth a total of 63%
    - Assignments worth a total of 37% (27% for graduate students)
    - In-class presentation 10% (for graduate students only)

- If an assignment has to be canceled for any reason, the remaining assignment weights will be prorated (scaled) to add up to 37% (27% for graduate students)

- If a quiz has to be canceled for any reason, the remaining quiz weights will be prorated (scaled) to add up to 63%.

- When calculating a student's assignment grade average, the best 3 assignments (out of 4) will only be considered. **(built-in completion flexibility)**

- When calculating a student's quiz grade average, the best 9 quizzes (out of 10) will only be considered. **(built-in completion flexibility)**

Q: Course Delivery and Assessment in Case of Any University-Declared Emergency

- **Contingency plan for an in-person class pivoting to 100% online learning**
  Although the intent is for this course to be delivered in person, should any university-declared emergency that necessitates the course delivery moving away from face-to-face interaction,
    - All remaining course content will be delivered entirely online, either:
        - synchronously (i.e., at the times indicated in the timetable) or
        - asynchronously (e.g., posted on OWL for students to view at their convenience).
    - The grading scheme will not change.
    - Any remaining assessments will also be conducted online as determined by the course instructor.

  In the event that online learning is required, *a stable internet connection with working microphone and webcam will be required.*

  As has been the case in the past, the decision to pivot to online learning will be made by Western, and not individual instructors or departments (excepting temporary online instruction in the event of instructor illness).

R: Accommodation for Students with Disabilities

Students with disabilities work with Accessible Education--formerly SSD-- (http://academicsupport.uwo.ca/accessible_education/index.html), which provides recommendations for accommodation based on medical documentation or psychological and cognitive testing. The accommodation policy can be found here:
https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic%20Accommodation_disabilities.pdf

S: Academic Accommodation for Student Absence

This course incorporated two forms of flexibility in quizzes, assignments, and labs assessments: **built-in submission deadline flexibility** and **built-in completion flexibility**. As a result of these flexibilities, all

academic considerations related to quizzes or assignments will be denied.

Students must familiarize themselves with the University Policy on Academic Consideration – Undergraduate Students in First Entry Programs posted on the Academic Calendar: https://www.uwo.ca/univsec/pdf/academic_policies/appeals/academic_consideration_Sep24.pdf.

T: Religious Accommodation

When a course requirement conflicts with a religious holiday that requires an absence from the University or prohibits certain activities, students should request accommodation for their absence in writing at least two weeks prior to the holiday to the course instructor and/or the Academic Counselling office of their Faculty of Registration.

Please consult the Diversity Calendar for list of recognized holidays at https://www.edi.uwo.ca/diversity-calendar/2025-diversity-calendar.pdf.

For further information, please consult the University's Accommodation for Religious Holidays policy at https://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_religious.pdf.

U: Tutoring

The role of tutoring is to help students understand the course material. Tutors should **not** write assignments or tests for the students who hire them. Submitting an assignment that contains material written by a tutor is an academic offense.

Having employed the same tutor as another student is not a legitimate defense against an accusation of collusion, should two students hand in assignments judged similar beyond the possibility of coincidence.

The Computer Science Department does not have or maintain any tutoring list.

V: Support Services

Please visit the Science & Basic Medical Sciences Academic Counselling webpage for information on add/drop courses, academic considerations for absences, appeals, exam conflicts, and many other academic-related matters: https://www.uwo.ca/sci/counselling/

Students who are in emotional/mental distress should refer to Mental Health at Western (http://www.uwo.ca/uwocom/mentalhealth) for a complete list of options about how to obtain help.

Western is committed to reducing incidents of gender-based and sexual violence and providing compassionate support to anyone who has gone through these traumatic events. If you have experienced sexual or gender-based violence (either recently or in the past), you will find information about support services for survivors, including emergency contacts at https://www.uwo.ca/health/student_support/survivor_support/get-help.html
To connect with a case manager or set up an appointment, please contact support@uwo.ca

Learning-skills counsellors at the Student Development Centre (https://learning.uwo.ca/) are ready to help you improve your learning skills. They offer presentations on strategies for improving time management, multiple-choice exam preparation/writing, textbook reading, and more. Individual support is offered throughout the Fall/Winter terms in the drop-in Learning Help Centre, and year-round through individual counselling.

Western University is committed to a thriving campus as we deliver our courses in the mixed model of both virtual and face-to-face formats. We encourage you to check out the Digital Student Experience website to manage your academics and well-being: https://studentexperience.uwo.ca/

Students may refer to http://westernusc.ca/your-services for services provided by the USC.

Students may refer to http://www.registrar.uwo.ca for the Registrarial Services.