

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

**CS 4481b/9628b - Image Compression
Course Outline - Winter (January -- April) 2022**

This course uses the Online Western's Learning (OWL) system (<https://owl.uwo.ca>)

A: Instructor

- Professor [Mahmoud El-Sakka](#)
Middlesex College, Room 419
Phone: 661-2111 x86996
Email: [elsakka <at> csd.uwo.ca](mailto:elsakka@csd.uwo.ca)
Office hours: Tuesday from 1:30 pm to 2:15 pm
Office hours: Thursday from 1:30 pm to 2:15 pm

B: Graduate Teaching Assistant

- Andrew Katoch
Email: [akatoch2 <at> uwo.ca](mailto:akatoch2@uwo.ca)

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

C: Lectures

- Time: Wednesday 10:30 am - 1:30 pm
- Place: FNB 3220

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/C++ programming

Unless you have either the prerequisites for this course or written special permission from your Dean to enroll in it, you will be removed from this course and it will be deleted from your record. This decision may not be appealed. You will receive no adjustment to your fees in the event that you are dropped from a course for failing to have the necessary prerequisites.

G: Antirequisites

- Computer Science 9532a/b

H: Textbook

[Introduction to Data Compression, 5th Edition](#)

By [Khalid Sayood](#)

Elsevier/Morgan Kaufmann, 2017.

I: Course Website

The CS 4481b course uses the Online Western's Learning (OWL) system (<https://owl.uwo.ca>)

Lecture notes, assignments, and class information will be posted on this website. You are responsible for reading this information frequently.

Possessing (and even reading) lecture notes is not a suitable substitute for attending lectures.

J: 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.

K: 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.

L: Assignment Conduct

- There will be 4 equal weight assignments:
- Tentative assignments schedule:

Assignment no.	To be posted on	Back after	Due on
1	Wednesday January 26	15 days	Thursday February 10
2	Wednesday February 9	22 days	Thursday March 3
3	Wednesday March 2	15 days	Thursday March 17
4	Wednesday March 16	15 days	Thursday March 31

- 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 are strongly discouraged.
 - 10% will be deducted from a late assignment (up to 24 hours after the due date/time)
 - 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.

M: Quiz Conduct

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

Quiz no.	date
1	Wednesday January 26
2	Wednesday February 2
3	Wednesday February 9
4	Wednesday February 16
5	Wednesday March 2
6	Wednesday March 9
7	Wednesday March 16
8	Wednesday March 23
9	Wednesday March 30
10	Wednesday April 6

N: 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.

O: 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 must write their essays and assignments in their own words. Whenever students take an idea or a passage from another author, they must acknowledge their debt both by using quotation marks where appropriate and by proper referencing such as footnotes or citations. Plagiarism is a major academic offence.

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

Assignments that are judged to be the result of academic dishonesty will, for the student's first offence, be given a mark of zero with an additional penalty equal to the weight of the assignment also being applied.

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](#).

P: Exam Schedule

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

Q: Student 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 your assignment grade average, best 3 assignments will only be considered.
- When calculating your quiz grade average, best 9 quizzes will only be considered.

R: Course Delivery and Assessment with Respect to the COVID-19 Pandemic

Although the intent is for this course to be delivered in-person to the extent possible, the changing COVID-19 landscape may necessitate some or all of the course to be delivered 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), as deemed most appropriate by the instructor. The grading scheme will not change. Any assessments affected will be conducted online as determined by the course instructor.

When deemed necessary, tests and examinations in this course will be conducted using a remote proctoring service. By taking this course, you are consenting to the use of this software and acknowledging that you will be required to provide personal information (including some biometric data) and that the session will be recorded. Completion of this course will require you to have a reliable internet connection and a device that meets the technical requirements for this service. More information about this remote proctoring service, including technical requirements, is available on Western's Remote Proctoring website at: <https://remoteproctoring.uwo.ca>.

Course Absences due to Daily COVID Screening Questionnaire

Missed assessments (e.g., presentations, essays, quizzes, tests, midterms, etc.) require formal academic considerations (typically self-reported absences and/or academic counselling). See https://www.uwo.ca/sci/counselling/procedures/academic_consideration_for_absences/index.html and [Section T: Academic Accommodation for Student Absence](#)

Students should be aware that some learning outcomes cannot be easily made up and may need to be completed in a subsequent year.

Students who demonstrate a pattern of routinely missing coursework due to self-reported COVID symptoms, and therefore do not demonstrate mastery of the learning outcomes of the course, will not receive credit for the course.

S: Accommodation Policies

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

In this course, both midterm tests and the final exam are timed, as shown in Section [Midterm Tests and Final Exam](#). If you are a student with a disability and require extra time accommodation, please ensure your accommodations are active on the Accommodated Exams website <https://studentservices.uwo.ca/Accommodatedexamssignup/> for this course **at least 10 days prior to the assessment** for which you require accommodation. **Recommended accommodations posted there on time will be applied to your assessment.**

T: Academic Accommodation for Student Absence

Students will have up to two (2) opportunities during the regular academic year to use an online portal to self-report an absence during the term. The duration of the self-reported absence is a maximum of 48 hours. Students can request that the period covered include Yesterday and Today, or Today and Tomorrow. Absences start at midnight (12:00 a.m.) on the first requested day and end at 11:59 p.m. the following day. The assessment for which consideration is being sought is worth 30% or less of the student's final grade.

Once a student has an approved self-reported absence, and their assignment/lab/quiz due date falls within the self-reported absence period, this due date will be extended by 24 hours without penalty.

Students are not able to use the self-reporting option in the following circumstances:

- for exams scheduled by the Office of the Registrar (e.g., December and April exams)
- absence of a duration greater than 48 hours,
- assessments worth more than 30% of the student's final grade,
- if a student has already used the self-reporting portal twice during the academic year

If the conditions for a self-reported absence are not met, students will need to provide a Student Medical Certificate if the absence is medical, or provide appropriate documentation if there are compassionate grounds for the absence in question. Students are encouraged to contact their Faculty academic counselling office to obtain more information about the relevant documentation. Students should also note that individual instructors are not permitted to receive documentation directly from a student, whether in support of an application for consideration on medical grounds or for other reasons. **All documentation required for absences that are not covered by the self-reported absence policy must be submitted to the Academic Counselling office of a student's Home Faculty.**

For further information, please see

https://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_illness.pdf.

A student requiring academic accommodation due to illness should use the Student Medical Certificate when visiting an off-campus medical facility or request a Record's Release Form (located in the Dean's office) for visits to Student Health Services. The form can be found here:

http://www.uwo.ca/univsec/pdf/academic_policies/appeals/medicalform.pdf.

U: Religious Accommodation

Students should consult the University's list of recognized religious holidays, and should give reasonable notice in writing, prior to the holiday, to the Instructor and an Academic Counsellor if their course requirements will be affected by a religious observance. Additional information is given in the Western Multicultural Calendar at https://www.uwo.ca/equity/doc/multicultural_calendar_supplement.pdf.

V: 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.

W: 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/>

Learning-skills counsellors at the Student Development Centre (<http://www.sdc.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://www.uwo.ca/se/digital/>

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.

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.
