

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

**CS 4481b/9628b - Image Compression
Course Outline - Winter (January -- April) 2020**

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
Office hours: Tuesday from 2:30 pm to 3:15 pm (tentative)
Office hours: Thursday from 2:30 pm to 3:15 pm (tentative)

B: Graduate Teaching Assistance

TBA

Teaching Assistances' Office hours: By appointment only

C: Lectures

- Time: Wednesday 10:30 am - 1:30 pm
- Place: MC-320

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: 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 Services for Students with Disabilities (SSD) at 661-2111 x 82147 for any specific question regarding an accommodation.

K: Computing Facilities

Each student will be given an account on the Computer Science Department undergraduate computing facility, GAUL. In accepting the GAUL account, a student agrees to abide by the department's [Rules of Ethical Conduct](#).

Note that, after-hours access to certain Computer Science lab rooms is by student card. If a student card is lost, a replacement card will not automatically open these lab rooms. In this case, the student must bring the new card to a member of the Systems Group in Middlesex College Room 346 to activate it.

L: Email Contact

We occasionally need to send email messages to the class or to students individually. Such emails are sent to the UWO email address as assigned to you by Information Technology Services (ITS), i.e. your email address @uwo.ca. It is your responsibility to read your email account on a frequent and regular basis, or to have it forwarded to an alternative email address if preferred. See the ITS website for directions on forwarding email.

However, note that the email at ITS (your UWO account) and other email providers may have quotas or limits on the amount of space they dedicate to each account. Unchecked emails may accumulate beyond those limits and you may be unable to retrieve important messages from your instructors. Losing emails is not an acceptable excuse for not knowing about the information that was sent.

M: 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 22	15 days	Thursday February 6
2	Wednesday February 5	22 days	Thursday February 27
3	Wednesday February 26	15 days	Thursday March 12
4	Wednesday March 11	15 days	Thursday March 26

- 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.

N: Quiz Conduct

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

- Tentative quizzes schedule:

Quiz no.	date
1	Wednesday January 22
2	Wednesday January 29
3	Wednesday February 5
4	Wednesday February 12
5	Wednesday February 26
6	Wednesday March 4
7	Wednesday March 11
8	Wednesday March 18
9	Wednesday March 25
10	Wednesday April 1

O: 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.

P: Ethical Conduct

Scholastic offences are taken seriously and students are directed 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 assignments. You may discuss approaches to problems among yourselves; 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](#).

Q: Tutoring

The role of tutoring is to help students understand 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.

R: Exam Schedule

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

S: Academic Accommodation for Medical Illness

If you are unable to meet a course requirement due to illness or other serious circumstances, you must provide valid medical or other supporting documentation to your Dean's office as soon as possible and contact your instructor immediately. It is the student's responsibility to make alternative arrangements with their instructor once the accommodation has been approved and the instructor has been informed. In the event of a missed final exam, a "Recommendation of Special Examination" form must be obtained from the Dean's office immediately. For further information, please see: http://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_medical.pdf and https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic_Consideration_for_absences.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.

For absence up to 48 hours for course work 30% and under you will need to use the online self-reporting tool to notify your instructors. Each student is allowed 2 missed 48 hours periods per academic year. Yes, it is two per academic year, it is not two per course. Beyond two you must see an advisor with official documentation. To request an academic consideration using the Self-Reported Absence, visit http://www.uwo.ca/sci/counselling/procedures/academic_consideration_for_absences/index.html

T: Support Services

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.

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.

U: 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.
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