THE UNIVERSITY OF BRITISH COLUMBIA
Department of Computer Science, Mathematics, Physics and Statistics
Okanagan Campus

COSC 344-101 Image Processing and Applications (W2022 T-1)

Instructor: Dr. Shan Du
Class Schedule: 18:30PM – 20:00PM Wednesday and Friday
Location: ART 206
Course Website: https://canvas.ubc.ca/courses/100282
Office Hours: 11:00AM – 12:00PM Monday on Canvas
E-mail: shan.du@ubc.ca **(preferred contact method)**

Teaching Assistant: Islam Osman, islam.osman@ubc.ca

Lab Section	Time
COSC 344 L01	Tue 14:00PM-16:00PM

Academic Calendar Entry
Fundamental theoretical and practical concepts for processing and analyzing real-world digital images and videos, image enhancement and filtering, frequency domain and other transform analysis, morphological image operations, image segmentation, and object recognition. Credit will be granted for only one of COSC 344, COSC 435, or COSC 445.
Credits: 3

Prerequisites: One of COSC 210, COSC 222 and one of MATH 200, APSC 248 and one of MATH 221, APSC 179.

Please note that students who lack the prerequisites should not register for this course and will receive a failing grade if they remain in it. Any exceptions must be brought to the attention of the instructor immediately.

Course Format
The course is structured by lectures and labs. Course materials will be available on Canvas.

Evaluation Criteria and Grading
Grading: Total 100%

- Lab Assignments (~6): 30%
- Quizzes (~4): 10%
- Midterm Exam: 15%
- Final Exam: 45%

Students MUST achieve a passing grade in overall in order to pass the course.

- All exams/quizzes are closed-book Canvas tests. No course materials, cell phones, or other electronic devices are allowed during the exam time. Computers are only used for the exams, not for checking, discussing or searching solutions.
- The course website contains the most up-to-date information and important dates for main events such as assignments due dates and tests. Students need to check regularly.
- Attendance is required in lectures and labs.

- If you feel any mark was unfair or incorrectly recorded, ensure that I am aware of the problem before the last week of classes.

Learning Outcomes

Upon successful completion of this course, students will be able to:

- Describe basic concepts, terminology, principles, and methods in the field of image processing.
- Design, implement, and systematically test fundamental methods and algorithms of image sensing and processing.
- Choose appropriate methods for image filtering, reconstruction, and segmentation.
- Understand and design image filtering techniques in the frequency domain
- Identify and use fundamental algorithms used for basic object recognition.

Late Policy

Late assignments will be deducted 10% per day up to 3 days (after which they will receive 0 marks).

Missed Tests

There will be no deferred quizzes/midterm exam. If you miss any of the quizzes with a valid excuse (according the UBC Okanagan's policy on excused absences from examinations), duly documented and reported to the instructor within one week of the exam, then the weight of that quiz will be transferred to other quizzes. For midterm exam, the grade will be deferred to the final exam. No midterm make-up or retake will be done.

For final exam, the student may retake a make-up final exam with the permission of the Dean's office. Note that a make-up exam may have a question format different from the original regular exam.

Important Dates

See http://okanagan.students.ubc.ca/calendar/

Textbook and Reference Materials

- Course website on Canvas
- Lecture Notes (available electronically).
- No required textbook
- Recommended Textbooks (Optional):
  Gonzalez, Rafael C. and Woods, Richard E., Digital Image Processing, 4th Edition, Pearson, 2018.
  Marques, Oge, Practical Image and Video Processing Using MATLAB, Wiley-IEEE Press, 2011.

Programming Language and Libraries

We will be using Matlab and Matlab image processing toolbox.

Course Schedule (tentative)

Week	Content
1	Introduction and Basic Concepts
	Digital Image Representation and Operations
2	MATLAB Basics

	Image Processing Toolbox
3	Image Sensing and Acquisition
	Arithmetic and Logic Operations, **Quiz 1**
4	Geometric Operations
	Gray-Level Transformations
5	Histogram Processing
	Neighborhood Processing
6	Frequency-Domain Filtering 1
	Frequency-Domain Filtering 2, **Quiz 2**
7	Image Restoration
	Morphological Image Processing
8	Edge Detection
	Image Segmentation 1
9	Image Segmentation 2
	Color Image Processing, **Quiz 3**
10	Midterm Break
11	**Midterm Exam**
	Image Compression and Coding
12	Feature Extraction and Representation 1
	Feature Extraction and Representation 2
13	Visual Pattern Recognition 1, **Quiz 4**
	Visual Pattern Recognition 2
14	Final Exam Review

Grading Practices

Faculties, departments, and schools reserve the right to scale grades in order to maintain equity among sections and conformity to university, faculty, department, or school norms. Students should therefore note that an unofficial grade given by an instructor might be changed by the faculty, department, or school. Grades are not official until they appear on a student's academic record.
http://www.calendar.ubc.ca/okanagan/index.cfm?tree=3,41,90,1014

Final Examinations

The examination period for W2022 T-1 is **Sunday December 11th, 2022, to Thursday December 22nd, 2022**.. Except in the case of examination clashes and hardships (three or more formal examinations scheduled within a 24-hour period) or unforeseen events, students will be permitted to apply for out-of-time final examinations only if they are representing the University, the province, or the country in a competition or performance; serving in the Canadian military; observing a religious rite; working to support themselves or their family; or caring for a family member. Unforeseen events include (but may not be limited to) the following: ill health or other personal challenges that arise during a term and changes in the requirements of an ongoing job.
Further information on **Academic Concession** can be found under **Policies and Regulation in the *Okanagan Academic Calendar*** http://www.calendar.ubc.ca/okanagan/index.cfm?tree=3,48,0,0

Academic Integrity

The academic enterprise is founded on honesty, civility, and integrity. As members of this enterprise, all students are expected to know, understand, and follow the codes of conduct regarding academic integrity. At the most basic level, this means submitting only original work done by you and acknowledging all

sources of information or ideas and attributing them to others as required. This also means you should not cheat, copy, or mislead others about what is your work. Violations of academic integrity (i.e., misconduct) lead to the breakdown of the academic enterprise, and therefore serious consequences arise and harsh sanctions are imposed. For example, incidences of plagiarism or cheating may result in a mark of zero on the assignment or exam and more serious consequences may apply if the matter is referred to the President's Advisory Committee on Student Discipline. Careful records are kept in order to monitor and prevent recurrences.

A more detailed description of academic integrity, including the University's policies and procedures, may be found in the Academic Calendar at:
http://okanagan.students.ubc.ca/calendar/index.cfm?tree=3,54,111,0.

Cooperation vs. Cheating

Working with others on assignments is a good way to learn the material and we encourage it. However, there are limits to the degree of cooperation that we will permit. Any level of cooperation beyond what is permitted is considered cheating.

When working on programming assignments, you must work only with others whose understanding of the material is approximately equal to yours. In this situation, working together to find a good approach for solving a programming problem is cooperation; listening while someone dictates a solution is cheating. You must limit collaboration to a high-level discussion of solution strategies, and stop short of actually writing down a group answer. Anything that you hand in, whether it is a written problem or a computer program, must be written by you, from scratch, in your own words. If you base your solution on any other written solution, you are cheating. If you provide your solution for others to use, you are also cheating.

Copyright Disclaimer

Diagrams and figures included in lecture presentations adhere to Copyright Guidelines for UBC Faculty, Staff and Students http://copyright.ubc.ca/requirements/copyright-guidelines/ and UBC Fair Dealing Requirements for Faculty and Staff http://copyright.ubc.ca/requirements/fair-dealing/. Some of these figures and images are subject to copyright and will not be posted to ***Canvas***. All material uploaded to ***Canvas*** that contain diagrams and figures are used with permission of the publisher; are in the public domain; are licensed by Creative Commons; meet the permitted terms of use of UBC's library license agreements for electronic items; and/or adhere to the UBC Fair Dealing Requirements for Faculty and Staff. Access to the ***Canvas*** course site is limited to students currently registered in this course. Under no circumstance are students permitted to provide any other person with means to access this material. Anyone violating these restrictions may be subject to legal action. Permission to electronically record any course materials must be granted by the instructor. Distribution of this material to a third party is forbidden.

Grievances and Complaints Procedures

A student who has a complaint related to this course should follow the procedures summarized below:

- The student should attempt to resolve the matter with the instructor first. Students may talk first to someone other than the instructor if they do not feel, for whatever reason, that they can directly approach the instructor.
- If the complaint is not resolved to the student's satisfaction, the student should e-mail the Associate Head, Dr. Yves Lucet at yves.lucet@ubc.ca or the Department Head, Dr. John Braun at cmps.depthead@ubc.ca.

STUDENT SERVICE RESOURCES

Disability Resource Centre

The Disability Resource Centre ensures educational equity for students with disabilities and chronic medical conditions. If you are disabled, have an injury or illness and require academic accommodations to meet the course objectives, please contact Earllene Roberts, the Diversity Advisor for the Disability Resource Centre located in the University Centre building (UNC 215).

UNC 215 250.807.9263
email: earllene.roberts@ubc.ca
Web: www.students.ok.ubc.ca/drc

Equity and Inclusion Office

Through leadership, vision, and collaborative action, the Equity & Inclusion Office (EIO) develops action strategies in support of efforts to embed equity and inclusion in the daily operations across the campus. The EIO provides education and training from cultivating respectful, inclusive spaces and communities to understanding unconscious/implicit bias and its operation within in campus environments. UBC Policy 3 prohibits discrimination and harassment on the basis of BC's Human Rights Code. If you require assistance related to an issue of equity, educational programs, discrimination or harassment please contact the EIO.

UNC 325H 250.807.9291
email: equity.ubco@ubc.ca
Web: www.equity.ok.ubc.ca

Office of the Ombudsperson for Students

The Office of the Ombudsperson for Students is an independent, confidential and impartial resource to ensure students are treated fairly. The Ombuds Office helps students navigate campus-related fairness concerns. They work with UBC community members individually and at the systemic level to ensure students are treated fairly and can learn, work and live in a fair, equitable and respectful environment. Ombuds helps students gain clarity on UBC policies and procedures, explore options, identify next steps, recommend resources, plan strategies and receive objective feedback to promote constructive problem solving. If you require assistance, please feel free to reach out for more information or to arrange an appointment.

UNC 328 250.807.9818
email: ombuds.office.ok@ubc.ca
Web: www.ombudsoffice.ubc.ca

Sexual Violence Prevention and Response Office (SVPRO)

A safe and confidential place for UBC students, staff and faculty who have experienced sexual violence regardless of when or where it took place. Just want to talk? We are here to listen and help you explore your options. We can help you find a safe place to stay, explain your reporting options (UBC or police), accompany you to the hospital, or support you with academic accommodations. You have the right to choose what happens next. We support your decision, whatever you decide.
Visit svpro.ok.ubc.ca or call us at 250-807-9640.

Independent Investigations Office (IIO)

If you or someone you know has experienced sexual assault or some other form of sexual misconduct by a UBC community member and you want the Independent Investigations Office (IIO) at UBC to investigate, please contact the **IIO**. Investigations are conducted in a trauma informed, confidential and respectful manner in accordance with the principles of procedural fairness.

You can report your experience directly to the **IIO by** calling 604-827-2060.
Web: https://investigationsoffice.ubc.ca/
E-mail: director.of.investigations@ubc.ca

Student Learning Hub

The Student Learning Hub (LIB 237) is your go-to resource for free math, science, writing, and language learning support. The Hub welcomes undergraduate students from all disciplines and year levels to access a range of supports that include **tutoring in math, sciences, languages, and writing, as well as help with study skills and learning strategies**.
For more information, please visit the Hub's website (https://students.ok.ubc.ca/student-learning-hub/) or call 250-807-9185.

Student Wellness

At UBC Okanagan health services to students are provided by Student Wellness. Nurses, physicians and counsellors provide health care and counselling related to physical health, emotional/mental health and sexual/reproductive health concerns. As well, health promotion, education and research activities are provided to the campus community. If you require assistance with your health, please contact Student Wellness for more information or to book an appointment.

UNC 337 250.807.9270
email: healthwellness.okanagan@ubc.ca
Web: www.students.ok.ubc.ca/health-wellness

SAFEWALK

Don't want to walk alone at night? Not too sure how to get somewhere on campus? Call Safewalk at ***250-807-8076.***
For more information, see: www.security.ok.ubc.ca