

CSC420: Intro to Image Understanding

Information Sheet

August 27, 2024

1 Course Description

This class is an introduction to fundamental concepts in image understanding, the subdiscipline of artificial intelligence that tries to make the computers “see”. It will survey a variety of interesting vision problems and techniques. Specifically, the course will cover image formation, features, object and scene recognition and learning, multi-view geometry and video processing. The goal of the class will be to grasp a number of computer vision problems and understand basic approaches to tackle them for real-world applications.

2 Course Information

Semester	Fall 2024
Logistics	Location: EM (Emmanuel College) – Room 1 Class Time: Tuesdays 14:00 – 16:00 Tutorials: Tuesdays 16:00 – 17:00
Office Hours (online)	Fridays 3:30–5:00 pm (over Zoom) https://utoronto.zoom.us/j/tocome password: to come
Webpage	https://q.utoronto.ca/ Course material (lecture notes, reading material, assignments, announcements, etc.) will be posted on Quercus
Forum	Piazza TAs will try to answer unanswered questions within 2 business days. Do not expect immediate response from the TAs. Do not expect answers during the weekends.
Textbook	1) http://szeliski.org/Book/ Richard Szeliski’s on-line textbook is a very good resource and is freely available online. We will assign readings from the 2022 version. 2) For some topics we will assign papers and online material to read.
Assignments	https://markus.teach.cs.toronto.edu/markus Should be submitted on MarkUs. You will automatically be added to MarkUs if you’re taking the course. Please do not email me or the teaching support staff if you are not on it yet at the beginning of the semesters. This will happen in a week or two.

3 Instructor

Name Babak Taati (Sections LEC0101 & LEC2001)

Email csc420-2024-09@cs.toronto.edu

I will **not** respond to CSC420 related emails sent to my other (work or personal) emails.

You **must** include CSC420 in the subject line.

Questions about the course material and assignments **must** be posted on the forum or asked during office hours.

Do **not** attempt to send zip files via email, they will be deleted by the mail server.

4 TAs

Vida Adeli

Ensieh Khazaei

Soroush Mehraban

Amirhossein Kazerouni

Kian Kianpisheh

Please do **not** email the TAs to ask questions. Answering email questions is not part of their contract and they are instructed not to respond. Please post questions about the course material and assignments on the forum, or ask them during the office hours.

5 Grading

Assignments 64%

There will be 4 assignments, posted every two/three weeks, starting with the second week. Each assignment is worth 16% of the grade. Assignments will consist of problem sets and programming problems with the goal of deepening your understanding of the material covered in class.

Ethics Module 1%

2 surveys, 0.5 each.

Final exam 35%

6 Policy

Assignments	Individually! For each assignment, you are allowed to work together with one other student in class. However, you are still expected to write the solutions/code/report in your own words; i.e. no copying. If you choose to work together with another student, you must write this in your assignment submission. For example, on the first line of your report.pdf file (after your own name an information, and before starting your answer to Q1), you should have a sentence that says: <i>“In solving the questions in this assignment, I worked together with my classmate [name & student number]. I confirm that I have written the solutions/code/report in my own words”.</i>
Attendance	You are expected to attend the lectures. I will expand on the slides, write down math proofs, etc. Materials I write down during the lecture are important for you to learn; so please attend and take notes if you want.
Deadline	The solutions to the assignments should be submitted by 10:59:00 pm on the date they are due . The first hour (up to 11:59:00 pm) incurs no lateness penalty. After that, from 61 minutes late to 24 hours will count as one late day.
Lateness	Each student will be given a total of 3 free late days (grace tokens). This means that one can hand in three of the assignments one day late, or one assignment three days late. It is up to the student to make a good planning of his/her work. After one has used the 3 day budget, the late assignments will not be accepted.
Plagiarism	We take plagiarism very seriously. Assignments must represent your own work. Read how not to plagiarize here.
Remark requests	Within 1 week only. Will not be accepted afterwards.
Generative AI	The work you submit for this assignment must be your own, and may not include any content from generative artificial intelligence (AI) tools, either verbatim or with edits. You may, however, use generative AI to support your work on this assignment in the following ways: • To answer general questions about high-level concepts covered in this course or assignment • To provide examples on the usage of a library’s API • To summarize information • To generate test cases for your code • To assist with understanding and debugging errors Please note that any uses of generative AI beyond the ones listed above are not allowed, and will be considered use of an unauthorized aid, which is a form of cheating.

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Policy (cont'd)

Special Considerations **All extension requests will be approved!** Please read these instructions carefully:

1. Extensions are automatically approved, but please use them judiciously. Do not use them as extra grace tokens and please only use them if you really have a situation that warrants an extension as you judge.
2. If you use the extension for an assignment, please be aware that you will receive your mark for that assignment later (possibly **much** later) than other students who submit on time.
3. If you use the extension for an assignment, please be aware that it takes time away from the allotted time for the next assignment. So please use extensions judiciously.
4. You do **not** need to send me an email or show me a UofT approved form or a doctor's note or anything else. All requests are automatically approved for 7 days.
5. Each assignment will have 2 entries on MarkUs, (e.g. A2 and A2_extended), with the latter having a due date exactly a week later than the former. To request an extension, simply don't submit anything to the first one and submit your solution to the latter).
6. **VERY IMPORTANT:** If you submit anything to the first one (e.g. an incomplete submission), your submission to the extended deadline will **not** be marked. I.e., you cannot submit your solutions to say A2, and then after the deadline continue working on it and submit your improved solutions to A2_extended. This will waste TA times and if you do this your submission to A2_extended will **not** be marked.
7. You **cannot** use grace tokens on extensions.

Longer extensions

We have a very generous extension policy in this course (1 hour no penalty, 3 grace tokens, and 1-week extensions for special circumstances. Longer extensions or accommodations will not be approved under any circumstances. Not submitting or missing the extended deadline by even a few seconds will result in a mark of 0 for that assignment. **To be fair to all students, absolutely no exceptions will be given under any circumstances.**

7 Deadlines

The table provides tentative dates on which assignments will be posted and their due date.

Term Work	Post Date	Due Date	Time to work on the assignment / Survey
Assignment 1	Monday Sep 16	Friday Oct 4	18 days
Assignment 2	Monday Oct 7	Friday Oct 18	11 days
Assignment 3	Monday Oct 21	Friday Nov 8	18 days (including the reading week)
Assignment 4	Monday Nov 11	Monday Nov 25	14 days
Ethics Survey #1	Monday Sep 23	Friday Sep 27	4 days (<u>tentative</u> . dates may change)
Ethics Survey #2	Monday Nov 18	Friday Nov 22	4 days (<u>tentative</u> . dates may change)

8 Course Schedule

A very tentative schedule for this term is as follows:

Week #	Dates	Topic
1	Sep 3	Introduction & linear filters
2	Sep 10	Edges & Image Pyramids
3	Sep 17	Deep learning & backpropagation
4	Sep 24	Recursive models & attention and transformers
5	Oct 1	Vision Transformers, CLIP & ethics module
6	Oct 8	Generative models (VAE, parti, pixelRNN, GAN)
7	Oct 15	Corner detection & Optical flow
8	Oct 22	Scale-invariant keypoints & SIFT
-	(reading week)	-
8	Nov 5	Affine transformation, RANSAC & Homography
9	Nov 12	Camera models & Homography (cond'd)
10	Nov 19	Stereo parallel optical axes & general case
11	Nov 16	Diffusion models