CSC420: Intro to Image Understanding

Information Sheet

1 Course Description

This class is an introduction to fundamental concepts in image understanding. It will survey a variety of interesting computer vision problems and modern techniques. The course will cover image formation and filtering, deep learning foundations, vision transformers and multimodal models, generative models, human body analysis, feature detection and optical flow, multi-view geometry, and neural scene representations. The goal of the class is to provide students with a solid understanding of the theory and practice of modern computer vision.

2 Course Information

Semester	Winter 2026
Logistics	KP 108 (Koffler Institute) Class Time: Mondays 13:00 – 15:00 Tutorials: Mondays 15:00 – 16:00
Office Hours (online)	Fridays 16:00-17:00 pm (over Zoom) `zoom.link.to.come` password: TBD
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 online textbook (*Computer Vision: Algorithms and Applications*) is a very good resource and is freely available online. We will assign readings from the 2022 version. **2)** `https://visionbook.mit.edu/` We will also assign some reading from this book (*Foundations of Computer Vision*) by Antonio Torralba, Phillip Isola, and William Freeman. **3)** 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
Email	csc2503-2025-09@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 Teaching Assistants

– Armen Jeddi

- TBD
- TBD

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	29% There will be 4 assignments, 7.25% each, posted approximately every two weeks, starting with the second week. Assignments will consist of problem sets and programming problems with the goal of deepening your understanding of the material covered in class. The Theory component of the assignments will **not** be marked and you don't need to submit your answers to those; but they will be good exercise questions for the midterm and final exams.
Midterm exam	30% A timed one-hour exam held during the lecture hour. There are no make-ups for the midterm. If you miss the midterm, we will add a 30% weight to your final exam (so that the final will be worth 70% of your total grade).
Ethics Module	1% 2 surveys, 0.5 each.
Final exam	40% closed-book, 3 hours

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: *"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".*
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.
	You are welcome to use AI assistants in a responsible fashion. You should not ask an AI assistant to complete your assignments for you; this is just as inappropriate as asking another student. However, you may ask an AI assistant questions about lecture material, clarifications about the assignments, tips on how to approach a problem, etc; i.e., you may discuss the assignments with the AI assistant in the same way you are allowed to discuss with your peers or the TAs. If you decide to use an AI assistant, you must include a sentence or two describing how you used it at the very top of your submitted assignment.

[continued on the next page]

Policy (cont'd)

Special Considerations

All assignment extension requests will be approved! Please read these instructions carefully:

1. All assignment extension request 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
Assignment 1	Monday Jan 12	Friday Jan 30	18 days
Assignment 2	Monday Feb 2	Friday Feb 23	21 days (including the reading week)
Assignment 3	Monday Feb 23	Friday Mar 13	18 days
Assignment 4	Monday Mar 16	Monday Mar 30	14 days

8 Course Schedule

A very **tentative** schedule for this term is as follows:

Week #	Dates	Topic
1	Jan 5	Introduction & linear filters & Machine learning review
2	Jan 12	Convolutional neural networks & backpropagation
3	Jan 19	Recursive models & attention and transformers
4	Jan 26	Vision Transformers, CLIP & Ethics Module
5	Feb 2	Generative models - part 1 (VAE, ..., GAN)
6	Feb 9	Generative models - part 2 (Diffusion, Flow matching)
-	Feb 16	Family day / Winter Reading week – no class
7	Feb 23	Pose and landmarks & **Midterm Exam**
8	Mar 2	Corner detection & Optical flow
9	Mar 9	Human parametric models & Action recognition
10	Mar 16	Camera models & Stereo (Parallel optical axes)
11	Mar 23	Stereo (General case) & Neural Radiance Fields and Gaussian Splatting
12	Mar 30	course review