COMP 4102, Winter 2025
Computer Vision

Lectures

Wednesdays, Fridays 14:35-15:55 pm
Start date: January 8
Classroom: Check Carleton Central for the room location

Instructor

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Course Description

This course introduces the fundamental principles and techniques of computer vision. A tentative list of topics include:

- Digital image formation and processing
- Detection and analysis of visual features
- Homography
- RANSAC
- Neural networks
- Camera models
- Stereo
- Epipolar
- Segmentation
- Recognition
- Applications

Learning Outcomes

At the end of this course, students will be able to:

- Explain the basic terms, concepts and applications of computer vision, including reference to at least one real-world system.
- Apply basic mathematical techniques to solve problems in computer vision.

Prerequisite

(COMP 2404 or SYSC 3010 or SYSC 3110) and (MATH 1104 or MATH 1107). Basic linear algebra and calculus, programming in Python.

Evaluation

- Assignments (40%)
- Midterm (20%) - around February
- Final Exam (40%)

Learning Material

Slides will be posted in Brightspace. No mandatory textbook, but a few good textbooks will be recommended. They are available online at no cost. For assignments related to neural networks, a Google colab subscription is highly recommended (14-70$ / months) or you can use a GPU-enabled computer. School of computer science also has a very limited number of GPUs.

Important Considerations

Late submission of assignments: 10% deduction for each of the first 5 days beyond the due time. Submissions that are late for more than 5 days will not be accepted.

Technical problems do not exempt you from this requirement, so if you wait until the last minute and then have issues with your connection, the above rule will still apply. Consequently, you are advised to:
- periodically upload you progress (e.g. upload your progress at least daily)
- attempt to submit your final submission at least one hour in advance of the due date and time

For each assignment, you will be submitting one or more files that contain source code, and these files must be given the correct filename and be provided in the specified format. Assignments that are incorrectly named or in the incorrect format will be penalized and may receive a mark of zero.

If any of the source code files you submit does not run, it will receive a mark of zero. Consequently, after you upload your submission to Brightspace you should re-download it immediately and ensure that your submission is the correct file type and has the correct filename, and your source code runs, and each of your source code files can be viewed in a text editor (for marking purposes).

You are expected to demonstrate good programming practices at all times and your code may be penalized if it is poorly written. You are also expected to do the necessary preparatory work (i.e., devising an algorithm) before you start coding. You may be asked to present either pseudocode or a flowchart before you will receive any assistance from the instructor or a teaching assistant.

SCS Computer Laboratory

Students taking a COMP course can access the SCS computer labs. The lab schedule and location can be found at: https://carleton.ca/scs/tech-support/computer-laboratories/ . All SCS computer lab and technical support information can be found at: https://carleton.ca/scs/tech-support/ . Technical support

staff may be contacted in-person or virtually, see this page for details: https://carleton.ca/scs/tech-support/contact-it-support/ .

Mental Health and Wellness

The Carleton Wellness Website is a wonderful resource link to include in the course outline for students.

Academic Accommodations

Carleton is committed to providing academic accessibility for all individuals. Please review the academic accommodation available to students here: https://students.carleton.ca/course-outline/.

Academic Integrity

If you are unsure of the expectations regarding academic integrity (how to use and cite references, how much collaboration with classmates is appropriate), ask your instructor. Sharing assignment specifications, slides, handouts and similar materials, or posting them online (to sites like Chegg, CourseHero, OneClass, etc.) is always considered academic misconduct. You are never permitted to post, share, or upload course materials without explicit permission from your instructor. Academic integrity offences are reported to the office of the Dean of Science. Penalties for such offences can be found on the ODS webpage: https://science.carleton.ca/academic-integrity/

Many of the assessed activities in this course were designed to be completed by an individual working alone. Unless it is explicitly stated otherwise, the use of AI generative models will be considered academic misconduct. This includes, but is not limited to, chatbots (e.g., ChatGPT, Microsoft Copilot, Google Gemini), research assistants (e.g., Elicit), and image generators (e.g., Stable Diffusion, Dall-E), etc. An exception to the above rule is made for automated grammar and punctuation checking tools (such as Grammarly).

References to any material you use but did not originate must use the IEEE/APA/MLA citation style. Failure to reference materials correctly can result in severe penalties, and the use of manufactured (i.e., falsified) or misleading references will be treated as evidence of plagiarism and considered academic misconduct.

Everything you submit for evaluation (i.e., assignments, quizzes, tutorials, examinations, etc.) must be the result of your own work and only your own work. If you use more than five consecutive words from a single source without providing a valid reference, then that is considered plagiarism and an example of academic misconduct.

Every student should be familiar with the Carleton University Student Academic Integrity policy. A student found in violation of academic integrity standards may be sanctioned with penalties which range from a reprimand to receiving a grade of F in the course, or even being suspended or expelled from the University. Examples of punishable offences include plagiarism and unauthorized collaboration.

Any such reported offences will be reviewed by the office of the Dean of Science. More information on this policy may be found on here: https://carleton.ca/registrar/academic-integrity/

As defined by Senate, "plagiarism is presenting, whether intentional or not, the ideas, expression of ideas or work of others as one's own". Such reported offences will be reviewed by the office of the Dean of Science. More information and standard sanction guidelines can be found here: https://science.carleton.ca/students/academic-integrity/.

Senate policy states that "to ensure fairness and equity in assessment of term work, students shall not co-operate or collaborate in the completion of an academic assignment, in whole or in part, when the instructor has indicated that the assignment is to be completed on an individual basis".

Undergraduate Academic Advisors

The Undergraduate Advisors for the School of Computer Science are available in Room 5302HP; or by email at scs.ug.advisor@cunet.carleton.ca . The undergraduate advisors can assist with information about prerequisites and preclusions, course substitutions/equivalencies, understanding your academic audit and the remaining requirements for graduation. The undergraduate advisors will also refer students to appropriate resources such as the Science Student Success Centre, Learning Support Services and Writing Tutorial Services.