

CS 583 Introduction to Computer Vision

Fall 2025-2026

Instructor Information:

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Class Hours: Wednesdays 3:00 pm – 5:50 pm

Classroom: TBD

Office Hours: Wednesdays 1:00-3:00pm (Hybrid)

Office Hours Zoom Link: <https://drexel.zoom.us/my/liufeng>

Credit Hours:

3 Credits

Prerequisite:

Programming (Python), algorithms, data structures, probability and statistics, linear algebra, 3D calc.

Catalog Description:

Visual information processing problems; human and machine vision systems; image formation; image transformations, encoding, enhancement; edge detection; segmentation; 2D and 3D object description and recognition; scene analysis; applications

Statement of Expected Learning:

To study problems associated with image acquisition, processing, and interpretation; to learn tools for solving computer vision problems in industry and various scientific disciplines; to understand the general process of designing a practical computer vision system.

Recommended Texts, Readings and Resources:

Text: R. Szeliski. Computer Vision: Algorithms and Applications. Free copy@ <http://szeliski.org/Book/>;

References: D. A. Forsyth and J. Ponce. Computer Vision: A Modern Approach (2nd Edition).

Typesetting: Overleaf (LaTeX compiled online, <https://overleaf.com/>)

Graded Assignments and Learning Activities:

Graded Homework:

Three homework assignments are planned, as shown in the course calendar. Written homework problems provide exercise on concepts and methods. Some programming may be needed to complete homework. Programming is intended to reinforce algorithms and concepts and to get correct results; it is NOT intended to be an exercise in software development (so minimum documentation and usability but careful testing). Students will often use multiple tools or programs. A report on program/algorithm behavior and results is required. Unless otherwise stated, ANY programming language or computer can be used, **while the Python language is preferred**. Students will be responsible if conversion of data or program modules is needed. Students should seriously consider using Python due to its rapid development capability. Also, students should become familiar with one or more popular image processing tools. It should be clear when basic algorithms should be implemented by the student and not obtained from an existing library or function. There are 4 total homework assignments. The first one, **Homework0, will NOT be graded**, while the other 3 will be graded.

Homework Report:

The homework report should be a single .pdf or .doc file. Handwork or hand annotated images or code is acceptable and can be scanned into electronic form. Program modules, if requested, should be in tar or zip form.

Report format is not rigid but should include the following elements.

- The problem[s] or homework objectives.
- The approach taken / major algorithm[s], possibly mentioning what alternatives were not taken.
- Results are most important, and how to get to the results is important too.
- Provide a few cases where things look good.
- Often there will be required cases.
- Document the parameters, process, etc.
- Provide a few cases where things don't look good.
- Document the parameters, process, etc.
- Concluding comments, how things went overall, what would be good to try if the work continued.

Project:

This is an opportunity to explore a topic in depth and should involve substantial work. This is a group project, **with 2-5 students per group**. This can be in implementation (e.g., implementing an existing algorithm), applications (e.g., applying computer vision to an existing problem), or research (e.g., trying something new in computer vision). Please start to look for partners. It will consist of:

- Proposal (1 page): The proposal should aim to explain what the problem is, why it's feasible to solve in the given timeline, and how you plan to achieve it.
- Progress report (1 page): The progress report should explain what progress you've made and be a steppingstone to the final report. That is, almost all your work for the progress report should be usable for the final report.
- Final Project Report (4 pages): The final project report should explain what you have done.
- We have only **10** slots available for final project presentations. Please sign up for your project using the link: https://docs.google.com/spreadsheets/d/19Rro9vfxTjeFz2a7O2Ulq1nrRJ62scDPtiPZ_sMRT_l/edit?usp=sharing
- Final presentation: Teams with in-person students are required to present in person. If all team members are in the online session, you have two options: a) Record a video presentation; b) Present live via Zoom.

***All written work should be in CVPR format ([.zip file here for word and latex](#)).**

Grading Matrix:

- Three assignments (17% * 3 = 51%)
- Final project proposal (10%)
- Final project report (17%)
- Final project presentation (17%)
- Participation (5%)

Grade Scale:

97-100 A+	92-96.99 A	90-91.99 A-	87-89.99 B+
82-86.99 B	80-81.99 B-	77-79.99 C+	72-76.99 C
70-71.99 C-	67-69.99 D+	60-66.99 D	0-59.99 F

Course Calendar:

[This schedule is tentative and may change during the course.]

Week	Topic	Suggested Reading	HW/Things Due
Week 1: Sept 24	Introduction and background; Projective Cameras I	S2.1	HW0 Out
Week 2: Oct 1	Projective Cameras II; Light and Shading	S2.1, S2.2, S2.3	HW0 Due, HW1 Out
Week 3: Oct 8	Numerical Linear Algebra	Zico Kolter Review	
Week 4: Oct 15	Linear and Nonlinear filtering; Detectors and Descriptors I	S3.2, S4.1	HW1 Due, HW2 Out
Week 5: Oct 22	Detectors and Descriptors II; Transformations I	S4.1, S2.1	
Week 6: Oct 29	Transformations II; Linear Models	S6, S14	HW2 Due, HW3 Out
Week 7: Nov 5	Continuous Optimization; Backpropagation and Neural Nets	CS231n Backprop Examples ;	Proposal due
Week 8: Nov 12	Convnets	CS231n Convnets	HW3 Due
Week 9: Nov 19	Detection; Intro to 3D vision; (Single-View Geometry; Stereo)	S8.4, S7, S11	
Week 10: Nov 26	No Classes		Progress Report due
Week 11: Dec 3:	Final project presentation		
Week 12: Dec 10	Final project report		Final Report due

Course Policies:

Assignments are due at 11:59:00pm (Anywhere in the world) unless otherwise stated.

You will lose 0.5pt for every hour late (round up) on an assignment up to 60hrs (after which you will receive a zero).

Any dispute about an assignment grade must be made and resolved within 5 days of receiving your grade. After this period your grade cannot be adjusted.

Except when groups are explicitly allowed, work must be done individually. You are encouraged to discuss the problems with your classmates, but you must not share details of the solutions. If you are unsure whether you have shared too much, discuss the situation with the TA or instructor; it is your obligation to avoid even the appearance of cheating.

Communications:

For communication, we will use emails. Please keep in mind that **I may not check emails before 9 a.m. or after 9 p.m. on weekdays, and I may not check them on weekends.** On weekdays, you should expect a response within 24 hours (often much sooner).

Please use your Drexel email address and include your full name if you email me. If I deem your questions necessary and helpful in private communication, I will share the questions with all students (without mentioning your name).

Academic Policies:

This course follows university, college, and department policies, including but not limited to:

- Academic Integrity, Plagiarism, Dishonesty and Cheating
Policy: http://www.drexel.edu/provost/policies/academic_dishonesty.asp
- Student Life Honesty Policy from Judicial
Affairs: <http://www.drexel.edu/provost/policies/academic-integrity>
- Students with Disability Statement: <http://drexel.edu/oed/disabilityResources/students/>
- Course Add/Drop Policy: <http://www.drexel.edu/provost/policies/course-add-drop>
- Course Withdrawal Policy: <http://drexel.edu/provost/policies/course-withdrawal>
- Department Academic Integrity Policy: <http://drexel.edu/cci/resources/current-students/undergraduate/policies/cs-academic-integrity/>
- Drexel Student Learning Priorities: <http://drexel.edu/provost/assessment/outcomes/dslp/>
- Office of Disability Resources: http://www.drexel.edu/ods/student_reg.html

The instructor(s) may, at his/her/their discretion, change any part of the course before or during the term, including assignments, grade breakdowns, due dates, and schedule. Such changes will be communicated to students via the course web site. This web site should be checked regularly and frequently for such changes and announcements.

Students [requesting accommodations](#) due to a disability at Drexel University need to request a current Accommodations Verification Letter (AVL) in the [ClockWork database](#) before accommodations can be made. These requests are received by Disability Resources (DR), who then issue the AVL to the appropriate contacts. For additional information, visit the DR website at drexel.edu/oed/disabilityResources/overview/, or contact DR for more information by phone at 215.895.1401, or by email at disability@drexel.edu.