

CSCI 4830/5722: Computer Vision, Spring 2019

Instructor: Ioana Fleming (ECOT 735)

Lecture: MWF 10:00 – 10:50 AM in ECCS 1B28.

Teaching Assistants:

Kamal Chaturvedi <Kamal.Chaturvedi@colorado.edu>

Kyle Reinholt <Kyle.Reinholt-1@colorado.edu>

Graders:

Office Hours:

Dr. Fleming: T from 8:30 – 10:30 am in ECOT 735, or by appointment (Piazza private message).

Complete office hours schedule and location will be available on Moodle.

Texts:

1. Ponce and Forsyth – *Computer Vision: A Modern Approach*, 4th edition (3rd edition ok as well)
2. Richard Szeliski – *Computer Vision: Algorithms and Applications*
http://szeliski.org/Book/drafts/SzeliskiBook_20100903_draft.pdf

Note: Research publications outlining several well-known computer vision algorithms will be distributed via Moodle.

Software:

Matlab (various versions) is installed on campus lab computers. A list of labs, with the associated environments and matlab version has been posted on Moodle. The latest release is 2018a. Instructions for downloading Matlab on your native machines is posted on Moodle as well.

Course materials, such as lecture notes and assignments, will be available in electronic form on the Moodle site for the course:

<http://moodle.cs.colorado.edu/>

Topics:

- Linea Algebra Review
- Image Transformations. Homogenous coordinates. Projective geometry
- Camera parameters. Camera Calibration
- Image Filters
- Edge Detection. Corner Detection. Fitting
- Feature Detection and Matching. Homographies. Image Stitching/Mosaicing
- Epipolar Geometry. Stereo Vision
- Segmentation, Recognition and Classification
- Dynamic Programming
- Face Detection

- Motion and Tracking. Optical Flow
- Classifiers. SVMs, Neural Nets
- Deep Learning – as time permits

Communication - Piazza:

All course related questions will be addressed via Piazza. Piazza is an online discussion forum where students can ask questions, answer questions and explore the topics covered in class. The instructors will offer guidance and also moderate discussions. Students are encouraged to answer the questions posed by their peers. *You can access Piazza by following the link at the top of Moodle*

Information for Distance Students:

This course requires the use of the Zoom conferencing tool, which is currently not accessible to users using assistive technology. If you use assistive technology to access the course material, please contact your faculty member immediately to discuss.

- Meeting ID: 520-395-912

- Connection options:

- Join via web browser: <https://cuboulder.zoom.us/j/520395912>
- Join via Zoom app (using meeting ID)
- Join via iPhone one-tap: US: +16699006833,,520395912# or +16465588656,,520395912#
- Join via telephone: US: +1-669-900-6833 or +1-646-558-8656

If you need help with getting Zoom up and running, please visit the following link:

<http://www.colorado.edu/oit/services/conferencing-services/web-conferencing-zoom>

Grading Policy:

Assignments (5-6): 80%

Project: 20%

Grading Interviews:

Homework assignments will be graded through an interview with the TA. Your TA will announce when grading meetings are available, and it is your responsibility to schedule an interview with your TA as soon as the scheduler is posted on Moodle. Your TA will ask you questions about the work you will have submitted the previous week. These questions are designed to test your understanding of the solution code submitted.

You must attend a grading meeting to receive credit for your work!

- **Sign-ups for the will be on Moodle, schedule your appointment early!**
- Not showing up without emailing in advance results in a zero. If you have to reschedule that is okay but you must email the TA at least **one**

day in advance (i.e. no waking up 5 minutes before the appointment, realizing you are going to be late, and sending the TA a panicked email cancelling at the last minute). Documented emergency situations are an exception and will be evaluated on a case-by-case basis.

- **You are responsible for scheduling the grading interview during the designated grading period (usually 1-2 weeks). Once the period expires you will not be able to have the grading interview and you will lose all the points for the assignment.**
- If, for any reason other than an emergency, you miss a grading interview, you are allowed to reschedule without any penalty only **one time** during the semester. If you miss a second time, you will be allowed to reschedule but you will incur a 25 points (out of 100) penalty, then 50 points for the third time. Rescheduling more than 3 times during the entire semester will not be allowed.
- You are responsible for finding the interview room and arriving on time.
- There is a 1-minute "grace period" for being late, after that it is 10% off for each minute the student is late, at 6 minutes late you get a zero.

- The advice we give to all students is to get to the appointment 5 to 10 minutes ***early*** and use the extra time to prepare.

Other Information:

1. **There will be NO late submissions.** The Moodle submission will be closed and you will not be able to submit if you are late. Please do not ask for extensions unless you have a documented emergency.
2. Written work must be neat and readable, with adequate spacing and margins. Your name, the date, and your section number must be at the top right of the first page. Code files should have your name, date, and homework number included as comments at the top of the file.
3. Attendance at all class meetings is highly recommended. You are responsible for knowing the material presented during class, even if you were not in attendance when the material was presented. Previous experience has shown me that students who do not attend class regularly often receive a failing grade and have to repeat the class the following semester.
4. Campus policy regarding religious observances requires that faculty make every effort to reasonably and fairly deal with all students who, because of religious obligations, have conflicts with scheduled exams, assignments, or required attendance. You can find the details at www.colorado.edu/policies. You must notify me of any such conflicts by the end of the first week of classes so we can work out alternatives.
4. A limited amount of printing may be required in this class. You need to ensure that your printing account has sufficient funds for this. Your initial allocation may deplete quickly, depending on your other printing activities. If this causes problems, please come see me.
5. If you qualify for accommodations because of a disability, please submit a letter to me from Disability Services **by the end of the second week of classes** so that your needs may be addressed. Disability Services determines accommodations based on documented disabilities. Contact info:

www.colorado.edu/disabilityservices, 303-492-8671, Willard 322. That office also maintains guidelines about temporary medical conditions or injuries.

6. In Class Expectations: It is my expectation that each of you will be respectful to your fellow classmates and instructors at all times. In order to create a professional atmosphere within the classroom, you are expected to:

- * Arrive to class on time
- * Turn off your cell phone (talk and text).
- * Bring your laptop to class if you have one to participate in classroom activities. Please restrict laptop use to these activities only, no email, Facebook, Youtube, etc.
- * Put away newspapers and magazines
- * Refrain from having disruptive conversations during class
- * Remain for the whole class; if you must leave early, do so without disrupting others
- * Display professional courtesy and respect in all interactions related to this class

Compliance with these expectations will assist all of us in creating a learning community and a high quality educational experience. The University of Colorado Classroom behavior policy compliments these classroom expectations:

University of Colorado Classroom Behavior Policy:

Students and faculty each have responsibility for maintaining an appropriate learning environment. Those who fail to adhere to such behavioral standards may be subject to discipline. Professional courtesy and sensitivity are especially important with respect to individuals and topics dealing with differences of race, culture, religion, politics, sexual orientation, gender, gender variance, and nationalities. Class rosters are provided to the instructor with the student's legal name. I will gladly honor your request to address you by an alternate name or gender pronoun. Please advise me of this preference early in the semester so that I may make appropriate changes to my records. See policies at

www.colorado.edu/policies/classbehavior.html or

www.colorado.edu/studentaffairs/judicialaffairs/code.html#student_code

7. Out of Class Expectations: Though many of the above stated policies address academic climate within the classroom, these policies should also be upheld outside of the classroom. As a member of the CU community you are expected to consistently demonstrate integrity and honor through your everyday actions. Faculty, TAs, and staff members are very willing to assist with your academic and personal needs. However, multiple professional obligations make it necessary for us to schedule our availability. Suggestions specific to interactions with faculty and staff include:

- * Respect posted office hours. Plan your weekly schedule to align with scheduled office hours.
- * Avoid disrupting ongoing meetings within faculty and staff offices. Please wait until the meeting concludes before seeking assistance. Respect faculty and staff policies regarding use of email and note that staff and faculty are not expected to respond to email outside of business hours. Send

email messages to faculty and staff using a professional format. Tips for a professional email include:

- * Always fill in the subject line with a topic that indicates the reason for your email to your reader.
- * Respectfully address the individual to whom you are sending the email (e.g., Dear Professor Smith).
- * Avoid email or text message abbreviations.
- * Be brief and polite.
- * Add a signature block with appropriate contact information.
- * Reply to email messages with the previously sent message. This will allow your reader to quickly recall the questions and previous conversation.

8. The University of Colorado at Boulder policy on Discrimination and Harassment, which can be found at www.colorado.edu/policies/discrimination.html, and the University of Colorado policy on Sexual Harassment and the University of Colorado policy on Amorous Relationships apply to all students, staff and faculty. Any student, staff or faculty member who believes she or he has been the subject of discrimination or harassment based upon race, color, national origin, sex, age, disability, religion, sexual orientation, or veteran status should contact the Office of Discrimination and Harassment (ODH) at 303-492-2127 or the Office of Judicial Affairs at 303-492-5550. Information about the ODH and the campus resources available to assist individuals regarding discrimination or harassment can be obtained at www.colorado.edu/odh

9. Resources for students who are experiencing stressful events during the semester at CU. We recommend that in these situations you contact the Student of Concern Team or the Student Support and Case Management. In addition to offering access and knowledge of support resources, the case managers will contact all your professors and TAs while keeping your information confidential. If you need an extension or repeated extensions for assignments because of stressful events in your life (loss, hospitalization, health concerns), the case manager will contact us with requests of support.

Student Support & Case Management

(information from <https://www.colorado.edu/studentaffairs/sscm>)

Student Support & Case Management (SSCM) provides support to students throughout their college career and helps them achieve their academic and personal goals. SSCM does not solve a student's problems for them, but rather helps identify issues and appropriate resources and works collaboratively with the student to develop an action plan.

The SSCM staff serves as the primary resource for managing student issues, providing intervention and crisis prevention. The case managers coordinate with other CU Boulder departments and facilitate communication to and from the [Student of Concern Team \(SOCT\)](#), which reviews more elevated student cases involving serious safety issues.

Student Support & Case Management **is not counseling or therapy**; rather, case managers have the opportunity to develop close helping relationships with students while coaching students toward appropriate self-care and self-advocacy.

Services

Offered services including, but not limited to, navigating campus and community resources, referrals to community providers, exploration of or referral for behavioral health concerns, coordination and follow-up during and after hospitalization and/or medical leave of absence, health and safety referrals, problem resolution, help managing multiple or complex medical needs, and crisis management.

Objectives

- To serve as a resource for faculty, staff and students so that student issues are being addressed in a timely manner.
- To serve as a resource for the CU Boulder community, addressing student behavior that may necessitate multiple responses.
- To balance the individual needs of the student with that of the greater community.
- To identify frameworks for effectively addressing student behaviors that may negatively impact the CU Boulder community.

10. IMPORTANT!!! CU Honor Code and CSCI Collaboration Policy

All students of the University of Colorado at Boulder are responsible for knowing and adhering to the academic integrity policy of this institution. Violations of this policy may include cheating, plagiarism, academic dishonesty, fabrication, lying, bribery, and threatening behavior. Plagiarism includes using material from outside sources (e.g., the web) without clear identification and citation.

This class also has specific guidelines for what is considered collaboration and what is considered academic dishonesty. The collaboration policy is given here:

CSCI 4830 / 5722 Spring 2019 Collaboration Policy

The Computer Science Department at the University of Colorado at Boulder encourages collaboration among students.

To support students in collaboration the Department has created a Collaboration Policy that makes explicit when their collaborative behavior is within the bounds of the Collaboration Policy and when it is actually academic dishonesty, which would be considered a violation of the [University's Honor Code](#). All students of the University of Colorado at Boulder are responsible for knowing and adhering to the University's Honor Code. Violations of this policy may also include cheating, plagiarism, academic dishonesty, fabrication, lying, bribery, and threatening behavior. Collaboration on homework assignments is allowed and encouraged. Students are most successful when they are working with other students to understand

new concepts. The ultimate goal is that you fully understand the code you develop.

Plagiarism includes using material from outside sources (e.g., Internet sources, chegg.com, coursehero.com, a tutor) without clear identification and citation. Unless otherwise specified, you may make use of outside resources (internet, other books, people), but then you must give credit by citing your sources in the comments inside your code.

Examples (assuming // indicates beginning of code comment):

```
// Modified version from https://github.com/Phhere/MOSS-PHP
// Adapted from Program #7.2 in book "Accelerated C++" by Stroustrup
// Worked with Joe Smith from class to come up with algorithm for
sorting
// Received suggestions from stackExchange website (see http://...)
// Worked with a tutor on the algorithm for the STORE function
```

A good rule of thumb: "If it did not come from your brain, then you need to attribute where you got it."

Note: you do not need to cite if you are adapting from slides for the course or the required textbook for the course or from the hired staff for the course.

ALL homeworks, all quizzes, all labs, and all exams will be required to be completed without outside resources. These will be clearly marked as individual assignments: the Moodle submission is individual. In these cases it is your responsibility to know the extent of approved resources and use only those that have been specifically allowed. Use of outside resources in these cases would violate the collaboration policy.

Adhering to the Collaboration Policy

Some examples of violating the collaboration policy include (but are not limited to):

- Sharing a file with someone else.
- Submitting a file that someone else shared with you.
- Stealing a copy of someone else's work and submitting as your own (even with modification).
- Copying outside resources.
- Using outside resources and not citing your sources.
- Posting on websites like chegg.com or craigslist.org soliciting a solution to an (or part of an) assignment. Soliciting help with commenting your code also constitutes violation of the collaboration policy
- Copying solutions from websites like chegg.com, coursehero.com, and other "tutoring" websites
- Using a solution the "tutor" gave you.

Examples of collaborating correctly:

- Asking another student for a helpful suggestion.

- Reviewing another student's code for issues/bugs/errors.
- Working together on the whiteboard (or paper) to figure out how to approach and solve the problem. In this case you must include that person's name in your collaboration list at the top of your submission. This includes working with a tutor.

One way to know you are collaborating well is if everyone fully understands the algorithm, and the code is developed individually. This collaboration policy requires that you be able to create the code (or solve the problem) on your own before you submit your assignment. There is also a difference between brainstorming a solution or algorithm and submitting the same code.

Even if collaboration is stated, it is a violation of the Honor Code to submit effectively identical code with another student or an outside source.

If two or more students submit the same solution, claiming they have been "working with the same tutor", that constitutes a violation of the Honor Code.

Any discovered incidents of violation of this collaboration policy will be treated as violations of the University's Academic Integrity Policy and will lead to an automatic academic sanction in the course and a report to both the College of Engineering and Applied Science and the Honor Code Council. **The academic sanction will be an automatic F.** Note: The instructor reserves the right to change the policy and to apply different academic sanctions if the violation justifies it. Students who are found to be in violation of the Academic Integrity Policy can be subject to non-academic sanctions as well, including but not limited to university probation, suspension, or expulsion.

Other information on the Honor Code can be found at www.colorado.edu/policies/honor.html and www.colorado.edu/academics/honorcode.

Collaboration boundaries are hard to define crisply, and may differ from class to class. If you are in any doubt about where they lie for a particular course, it is your responsibility to ask the course instructor.

11. GRADES follow the standard percentage breakdown for the College of Engineering:

93%-100%	A
90%-93%	A-
87%-90%	B+
83%-87%	B
80%-83%	B-
77%-80%	C+
73%-77%	C
70%-73%	C-
67%-70%	D+
63%-67%	D
60%-63%	D-
0%-60%	F