

COS 462/562 Image processing and Computer Vision

Department of Computer Science
Fall 2025

Instructor Info

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Student Hours: Th 3:30 to 5:30

Course Meetings

Science Building 290, Portland

Tu/Th 9:30 AM-10:45 AM



[Student Services and Policies Hub](https://mycampus.maine.edu/group/usm/student-services-and-policies-hub)¹.

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1. Course Information

1A. Course Description

In "Image Processing and Computer Vision," students will delve into the fascinating realm of visual data analysis. The curriculum covers fundamental image processing concepts, leveraging the powerful OpenCV library. From mastering basic image manipulation techniques to exploring Convolutional Neural Networks (CNNs) for advanced computer vision tasks, students will gain a comprehensive understanding of visual data analysis. This hands-on course combines theoretical foundations with real-world implementation, empowering students to apply their knowledge in diverse fields such as computer vision, artificial intelligence, and image recognition.

¹ [https://mycampus.maine.edu/group/usm/student-](https://mycampus.maine.edu/group/usm/student-services-and-policies-hub)

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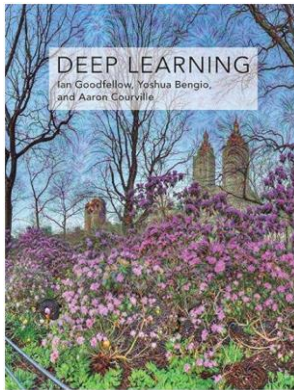
1B. Course Materials & Books

Recommendation:

1. **Deep Learning for Computer Vision with Python** by Adrian Rosebrock



2. **Deep Learning** by Ian Goodfellow and Yoshua Bengio and Aaron Courville



3. Given the rapid technological advancements in OpenCV, I recommend consulting the official website for the most current information: <https://docs.opencv.org/>, rather than relying on published textbooks.

1C. Course Learning Outcomes

In this synchronous course, the student will demonstrate:

- Process images using OpenCV.
- Master traditional image processing algorithms.
- Understand the basic structure of CNNs and their common variants.
- Use CNNs to solve common problems, including object detection, image classification, depth estimation, etc.

All these outcomes will be evaluated during the course.

2. Coursework & Grading

2A. Course Assessment

Assessment Name	Value
Class attendance	10%
Quiz	10%
6 Assignments	36%
Midterm Exam	10%
Project	34%
Total:	100%

2B. Attendance

Regular attendance and fully engaged participation is expected of all students. You will be required to sign your name by the end of every class.

2C. Assignment

Assignments should be completed individually; they will be due on the day by 11:59 PM. For example, assuming that the first homework due is Jan 1st, which means you should submit your work before Jan 1st at 11:59PM. All assignment reports (Microsoft Word or PDF file) and/or program source codes will be submitted and graded through Brightspace. There will be 6 assignments and each takes 6%.

2D. Quizzes

There will be seven quizzes given throughout the semester. The quiz is scheduled in class and you will have a 20-minute window to complete it. A student's five best scores will be used to compute their quiz average. Since two quizzes will be dropped for all students, makeup quizzes will not be given. Each quiz takes 2%.

2E. Midterm Exam

The Midterm exam, which takes the weight of 10% of the final evaluation, will be taken online through Brightspace and must be completed within the specified time.

2F. Project

Computer Vision and Image Processing is a practice-oriented course, hence the project component is significantly weighted, accounting for 34% of the final grade. This project is a team endeavor, with each group consisting of 1-3 members (up to three people). To ensure that the project progresses in the right direction, each group is required to deliver three presentations as the course unfolds, and each one contributes 6% to the final evaluation:

1. The first is the project proposal, which introduces the project background and related work.
2. The second presentation will cover the methods adopted.
3. The third is a final summary report of the project. Each presentation should last between 10-15 minutes.

Additionally, each group must submit a project report before the course concludes, which accounts for 16%.

Furthermore, to ensure everyone actively participates in the project, each individual must submit a peer evaluation of other group members at the end of the term. An individual's final score for the project will be the grade of the final project multiplied by the maximum of the group's mutual evaluation or 0.6. For example, if students A, B, and C form a group and the group's final score is 30 out of 36, and B and C rate A at 85% and 95% respectively, then Student A's final score for the project part would be the group score (30) * the average group mutual evaluation $((0.95 + 0.85) / 2) = 27$.

2G. Grading System

Letter grades are assigned based on the final percent using the interval values:

Grade	% Bound
A	93 - 100
A-	90 - 92.99
B+	87 - 89.99
B	83 - 86.99
B-	80 - 82.99
C+	77 - 79.99

Grade	% Bound
C	73 - 76.99
C-	70 - 72.99
D	60 - 69.99
F	<60

3. Class Schedule

Week	Topics	Note	Due
1	Introduction, class overview		
	Setting up experimental environment: Python, PyTorch		
2	Introduction to OpenCV, discussion of the project's topic		
	OpenCV: basic operations	Find your teammate in class	
3	OpenCV: image transformation	Quiz 1	
	Edge Detection Algorithms		
4	Continue: Edge Detection	Determine the project topic	HW1
	Feature Detection Algorithms	Quiz 2	
5	Continue: Feature Detection Algorithms		
	OpenCV and Machine Learning	Quiz 3	HW2
6	Topic: how to do research, Prepare for Midterm Exam		
	Midterm, no class		

7	Fall break no class		
	Introduction to CNNs	Quiz 4	HW3
8	CNNs 2		
	CNNs 3	Presentation: Project proposal	
9	CNNs: Coding	Presentation: Project proposal	
	CNN: Practice	Presentation: Project proposal	
10	Variants of CNNs: ResNet	Quiz 5	HW4
	Encoder-decoder Structure		
11	Veterans Day, no classes		
	Topic: Technical Writing	Quiz 6	
12	Common Tasks: Image Classification	Presentation: Proposed method	
	Common Tasks: Object Detection	Presentation: Proposed method	
13	Common Tasks: Segmentation	Presentation: Proposed method	HW5
	Thanksgiving day, No class		
14	Attention Mechanism in CV		
	Catch-up and Review	Quiz 7	
15	Final Presentation I		
	Final Presentation II		HW6

4. Course-Specific Policies

4A. Late Assignments

Late assignments will be marked down 10% per day that they are late (except under special circumstances such as illness or other unanticipated impediments). Late assignments will also not be accepted after the last class lecture unless a prior arrangement has been made.

4B. Plagiarism

Plagiarism is turning in work that is not your own. Searching the internet for answers or using answers created by others is plagiarism and may result in failing the course as well as appropriate disciplinary action. It is your responsibility to not leave your work where others might copy it.

4C. Getting help

I want everyone to succeed. Do not put off getting help when you need it.

- Use the discussion board in Brightspace.
- Join student hours (or by appointment).
- Use the tutoring available through the Learning Commons which is available both on-campus and by Zoom. Learn more and schedule an appointment at: usm.maine.edu/learningcommons.

5. Academic Services & Policies

Below you'll find a brief list highlighting some of the most crucial student services and supports.

- **Request disability accommodations** | (207) 780-4706 | dsc-usm@maine.edu
- **Report Interpersonal violence** | (207) 780-5767 | usm.titleix@maine.edu
- **Report on-campus emergencies and safety concerns** | (207) 780-5211 or your local police agency.
- **Get academic help** | mycampus.maine.edu/group/usm/learning-commons
- **Get technology help** | usm.maine.edu/computing/helpdesk
- **Meet with an academic advisor** | usm.maine.edu/advising

For USM's most complete and current information on services available to students, as well as academic policies, use the QR Code to go to the [Student Services and Policies Hub webpage](https://mycampus.maine.edu/group/usm/student-services-and-policies-hub)².



² <https://mycampus.maine.edu/group/usm/student-services-and-policies-hub>