**Course Topics:** Processing Edges; Object Detection; Motion Processing; Convolutional Neural Networks; Deep Networks; Review of Current Research Topics

**Pre-requisites:** COP 3503C and MAC 2312, or C.I.

**Textbook:** No Textbook. All materials are provided electronically at the website: [www.cs.ucf.edu/courses/cap4453](http://www.cs.ucf.edu/courses/cap4453), which is the official class website.

**Evaluation:**

1 in-class test (41%); 4 programming assignments (18%); 1 project (41%).

Based on total score, grades are given as: W, A(>95), A-(>91), B+(>88), B(>84), B-(>81), C+(>78), C(>74), C-(>70), D+(>67), D (>63), D-(>60), F (<60) and I (rarely)

**Course Learning Outcomes:**

- Write programs for vision.
- Orally present explanations for a recent vision research paper.
- Become familiar with the process of reading a recent vision research paper.
- Use existing vision libraries to demonstrate vision capabilities.

**Course Abstract:** The study of mechanical vision is one of the few areas of science which blends one’s intuition with formal methods. Vision (whether in humans or machines) is fundamentally a computational process. Visual processes for machines must be able to deliver the kinds of capabilities that humans have: scene recognition, motion processing, navigational abilities, and so forth. This course will begin by examining some of the elementary concepts in machine vision. Subprocesses to be examined include: edge detection, object detection, motion analysis, and convolutional neural networks for machine vision. The student will be exposed to unsolved problems in these topics, the solutions to which have very high technological pay-offs. The workload consists of interesting reading, programming, a written test and a report (oral and written) on a recent research publication. This class is suitable for undergraduate students in Computer Science and Engineering disciplines, and anyone else who wishes an introduction to machine vision.
### Schedule of Dates

<table>
<thead>
<tr>
<th>DATE</th>
<th>Test (41%)</th>
<th>Assignmt (18%)</th>
<th>Project (41%)</th>
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<tbody>
<tr>
<td>Wed, Jan 22</td>
<td>Assign 1</td>
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<tr>
<td>Wed, Feb 5</td>
<td>Assign 2</td>
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<tr>
<td>Wed, Feb 26</td>
<td>Test</td>
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<td>Fri, Feb 28</td>
<td>Proposal</td>
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<td>Mon, Mar 2</td>
<td>Presentation1</td>
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<td>Wed, Mar 18</td>
<td>Assign 3</td>
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<td>Fri, Mar 20</td>
<td>WITHDRAWAL DEADLINE</td>
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<td>Fri, Apr 3</td>
<td>Assign 4</td>
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<td>Mon, Apr 6</td>
<td>Presentation2</td>
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<tr>
<td>Wed, Apr 22</td>
<td>Completed Proj Report</td>
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**VERY IMPORTANT NOTES:**

1) **Required Text:** None; all notes will be written on the board day-to-day or handed out in class or provided on the class website. The student is responsible for taking good notes.

2) **You are required to attend every class, except in case of an emergency.**

3) **Every assignment is graded as ALL or NOTHING.** So, you must get an assignment fully correct to get any points. No partial credit.

4) **Sharing of homework code or homework solutions is not permitted.** Also, when asked to write a program, you must actually write it yourself, and not obtain it from other sources, such as, some website or students from prior offerings of vision classes. Cheating will be dealt with severely. Also, read the Academic Integrity statement below.
Academic Integrity:

Students should familiarize themselves with UCF’s Rules of Conduct. According to Section 1, “Academic Misconduct”, students are prohibited from engaging in Unauthorized assistance: Using or attempting to use unauthorized materials, information or study aids in any academic exercise unless specifically authorized by the instructor of record. The unauthorized possession of examination or course-related material also constitutes cheating.

Communication to another through written, visual, electronic, or oral means: The presentation of material which has not been studied or learned, but rather was obtained through someone else’s efforts and used as part of an examination, course assignment, or project.

Commercial Use of Academic Material: Selling of course material to another person, student, and/or uploading course material to a third-party vendor without authorization or without the express written permission of the university and the instructor. Course materials include but are not limited to class notes, Instructor’s PowerPoints, course syllabi, tests, quizzes, labs, instruction sheets, homework, study guides, handouts, etc.

Falsifying or misrepresenting the student’s own academic work.

Plagiarism: Using or appropriating another’s work without any indication of the source, thereby attempting to convey the impression that such work is the student’s own.

Multiple Submissions: Submitting the same academic work for credit more than once without the express written permission of the instructor.

Helping another violate academic behavior standards.

Accessibility:

UCF is committed to providing access and inclusion for all persons with disabilities. Students with disabilities who need disability-related access in this course should contact the professor as soon as possible. Students should also connect with Student Accessibility Services (SAS) http://sas.sdes.ucf.edu (Ferrell Commons 185, sas@ucf.edu, phone 407-823-2371).
Safety:

Emergencies on campus are rare, but if one should arise during class, everyone needs to work together. Students should be aware of their surroundings and familiar with some basic safety and security concepts. In case of an emergency, dial 911 for assistance.

Every UCF classroom contains an emergency procedure guide posted on a wall near the door. Students should make a note of the guide's physical location and review the online version at http://emergency.ucf.edu/emergency_guide.html.

Students should know the evacuation routes from each of their classrooms and have a plan for finding safety in case of an emergency.

If there is a medical emergency during class, students may need to access a first-aid kit or AED (Automated External Defibrillator). To learn where those are located, see http://www.ehs.ucf.edu/workplacesafety.html (click on link from menu on left).

To stay informed about emergency situations, students can sign up to receive UCF text alerts by going to ucf.edu and logging in. Click on "Student Self Service" located on the left side of the screen in the toolbar, scroll down to the blue "Personal Information" heading on the Student Center screen, click on "UCF Alert", fill out the information, including e-mail address, cell phone number, and cellphone provider, click "Apply" to save the changes, and then click "OK."

Students with special needs related to emergency situations should speak with their instructors outside of class.

To learn about how to manage an active-shooter situation on campus or elsewhere, consider viewing this video at https://youtu.be/NlKYajEx4pk

Active Duty:

Students who are deployed active duty military and/or National Guard personnel and require accommodation should contact their instructors as soon as possible after the semester begins and/or after they receive notification of deployment to make related arrangements.