



## Syllabus for EECS274: Computer Vision

Spring 2018

Instructor: Shawn Newsam

<b>Designation:</b>	Computer Vision
<b>Catalog Description:</b>	Introduces algorithms and techniques for understanding contents in single and multiple images. Covers low-level, mid-level, high-level vision and recent research developments.
<b>Text Books and Other Required Materials:</b>	David Forsyth and Jean Ponce, Computer Vision: A Modern Approach, 2nd Edition, Pearson, 2011.  Richard Szeliski, Computer Vision: Algorithms and Applications, Springer, 2011.
<b>Course Objectives/ Student Learning Outcomes:</b>	<p>The objectives of this course are for students to learn the fundamental theories and techniques of computer vision. This will be achieved through the mathematical derivation and treatment of the topics as well as through implementation in programming assignments.</p> <p>The study of computer vision provides our students with the knowledge to correctly apply the laws of nature to the creative formulation and solution of engineering problems through the use of analytical, computational and experimental techniques (EECS WASC objective 1). The underlying principles such as geometric image formation models provide a solid background on the pertinent computer science, mathematical, and electrical engineering concepts that make up the foundations of the discipline of electrical engineering and computer science engineering, as well as their closely associated fields (EECS WASC objective 2).</p> <p>With regards to student learning outcomes, two-dimensional filtering theory will help provide mastery of a broad and working knowledge of the principles of electrical engineering and computer science (EECS WASC outcome a). Computer vision topics such as image formation, segmentation, and object detection will provide students with the ability to apply knowledge of computing, mathematics, science and engineering to solve problems in multidisciplinary research (EECS WASC outcome b). And, the programming assignments will provide students with the ability to analyze a problem, and identify and define the hardware and software requirements appropriate to its solution (EECS WASC outcome c).</p>
<b>Program Learning Outcomes:</b>	
<b>Prerequisites by Topic:</b>	Undergraduate level math; undergraduate course on computer vision; or consent of the instructor.
<b>Course Policies:</b>	
<b>Academic Dishonesty Statement:</b>	a. Each student in this course is expected to abide by the University of California, Merced's Academic Honesty Policy. Any work submitted by a student in this

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	course for academic credit will be the student's own work.
	b. You are encouraged to study together and to discuss information and concepts covered in lecture and the sections with other students. You can give "consulting" help to or receive "consulting" help from such students. However, this permissible cooperation should never involve one student having possession of a copy of all or part of work done by someone else, in the form of an e mail, an e mail attachment file, a diskette, or a hard copy. Should copying occur, both the student who copied work from another student and the student who gave material to be copied will both automatically receive a zero for the assignment. Penalty for violation of this Policy can also be extended to include failure of the course and University disciplinary action.
	c. During examinations, you must do your own work. Talking or discussion is not permitted during the examinations, nor may you compare papers, copy from others, or collaborate in any way. Any collaborative behavior during the examinations will result in failure of the exam, and may lead to failure of the course and University disciplinary action.
<b>Disability Statement:</b>	Accommodations for Students with Disabilities: The University of California Merced is committed to ensuring equal academic opportunities and inclusion for students with disabilities based on the principles of independent living, accessible universal design and diversity. I am available to discuss appropriate academic accommodations that may be required for student with disabilities. Requests for academic accommodations are to be made during the first three weeks of the semester, except for unusual circumstances. Students are encouraged to register with Disability Services Center to verify their eligibility for appropriate accommodations.
<b>Topics:</b>	<p>Topics include:</p> <p>Image formation: camera models, camera calibration, radiometry, color, shading</p> <p>Early vision: stereopsis, structure from motion, illumination, reflectance, shape from X, texture</p> <p>Mid-level vision: segmentation, grouping, Kalman filters, particle filters, shape representation</p> <p>High-level vision: correspondence, matching, object detection, object recognition, visual tracking</p>
<b>Class/laboratory Schedule:</b>	LECT TR 12:00-1:15pm CLSSRM 279
<b>Midterm/Final Exam Schedule:</b>	
<b>Course Calendar:</b>	
<b>Professional Component:</b>	
<b>Assessment/Grading Policy:</b>	<p>Class attendance and participation: 10%</p> <p>Homework: 30%</p> <p>Programming assignments: 30%</p> <p>Project: 30%</p>
<b>Coordinator:</b>	Shawn Newsam
<b>Contact Information:</b>	snewsam@ucmerced.edu
<b>Office Hours:</b>	TBD