

# Syllabus for CSE107-01: Intro to Digital Image Process

Spring 2022

Instructor: Shawn Newsam

<b>Designation:</b>	Introduction to Digital Image Processing
<b>Catalog Description:</b>	Overview of digital image processing including visual perception, image formation, spatial transformations, image enhancement, color image representations and processing, edge detection, and image segmentation.
<b>Text Books and Other Required Materials:</b>	Gonzalez and Woods, Digital Image Processing, 4th Edition, Prentice Hall, 2018.
<b>Course Objectives/ Student Learning Outcomes:</b>	<p>At the end of the course, the students will be able to implement, in computer code, algorithms to process digital images such as image resizing, spatial filtering, edge detection, histogram equalization, and the Hough transform.</p> <p>This will be achieved by presenting the background and mathematical foundations of the algorithms during lecture, and by the having the students implement and evaluate the algorithms through the lab projects.</p>
<b>Program Learning Outcomes:</b>	
<b>Prerequisites by Topic:</b>	CSE 031 Minimum Grade: C- And CSE 100 Minimum Grade: C- And MATH 024 Minimum Grade: C-
<b>Course Policies:</b>	<p>Unless otherwise specified, ALL WORK IS TO BE YOUR OWN. This includes the homework and lab assignments.</p> <p>Late homework and lab assignments can be turned in up to one day late for 10% off. Assignments that are more than one day late will not be accepted.</p>
<b>Academic Dishonesty Statement:</b>	<p>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 course for academic credit will be the student's own work.</p> <p>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.</p> <p>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.</p>
<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.

**Topics:**

1. Digital Image Fundamentals

- Elements of Visual Perception
- Light and the Electromagnetic Spectrum
- Image Sensing and Acquisition
- Image Sampling and Quantization
- Some Basic Relationships Between Pixels
- Linear vs. Nonlinear Operators
- Geometric Transformations and Image Registration
- Affine Transformations

2. Intensity Transformations and Spatial Filtering

- Histogram Processing
- Spatial filtering
- Smoothing Spatial Filters
- Sharpening Spatial Filters

3. Image Segmentation

- Edge Detection
- Hough Transform
- Segmentation Based on Thresholding
- Watershed Segmentation

4. Color Image Processing

- Color Fundamentals
- Color Models
- Color Transformations

**Class/laboratory**

**Schedule:**

**Midterm/Final Exam**

**Schedule:**

**Course Calendar:**

**Professional Component:**

**Assessment/Grading** Homework assignments: 25%

**Policy:** Lab assignments: 30%

Midterm exam: 20%

Final exam: 25%

**Coordinator:**

**Contact Information:** [snewsam@ucmerced.edu](mailto:snewsam@ucmerced.edu)

**Office Hours:**