

CAP 4401 – Digital Image Processing

Credits: 3 credits

Text book, title, author, and year: *Practical Image and Video Processing Using MATLAB*, by Oge Marques, Wiley/IEEE Press, 2011.

- a. **Supplemental materials:** none.

Specific course information

- a. **Catalog description:** Introduction to image processing principles, tools, techniques, and algorithms. Includes topics in image representation, analysis, filtering, and segmentation, and pattern recognition. Use of image processing software tools for lab assignments and projects.
- b. **Prerequisites:** COP 3530
- c. **Required, elective, or selected elective:** elective

Specific goals for the course

- a. **Specific outcomes of instruction:** By the end of the course students will be able to: (i) Explain the main challenges behind the design of machine vision systems; (ii) Describe the general processes of image acquisition, storage, enhancement, segmentation, representation, and description; (iii) Design and implement filtering and enhancement algorithms for monochrome as well as color images using MATLAB; (iv) Design and implement software solutions for visual pattern recognition.

Brief list of topics to be covered:

- Introduction to image processing and computer vision
- Image processing basics
- MATLAB basics
- The Image Processing Toolbox
- Image sensing and acquisition
- Arithmetic and logic operations
- Geometric operations
- Image enhancement in the spatial domain
- Frequency domain filtering
- Image restoration
- Morphological image processing
- Edge detection
- Image segmentation
- Color image processing
- Feature extraction and representation
- Visual pattern recognition