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.

Prerequisites: COP 3530 or permission from instructor.

Course objectives:
To introduce the most important concepts, techniques, and algorithms for digital image processing, and implement them using image processing software tools, particularly MATLAB. More specifically, it should enable students to:

- Assess and understand the challenges behind the design of machine vision systems.
- Understand the general processes of image acquisition, storage, enhancement, segmentation, representation, and description.
- Implement filtering and enhancement algorithms for monochrome as well as color images.
- Appreciate the challenges and understand the principles and applications of visual pattern recognition.

Textbook: — None —
Students will receive free draft copies of Dr. Marques’s upcoming textbook (“Practical Image and Video Processing Using MATLAB” – Wiley, 2011) in separate fascicles, distributed throughout the semester.

Course outline (book chapters in parentheses):

1. Introduction to image processing and computer vision (1)
2. Image processing basics (2)
3. MATLAB basics (3)
4. The Image Processing Toolbox (4)
5. Image sensing and acquisition (5)
6. Arithmetic and logic operations (6)
7. Geometric operations (7)
8. Image enhancement in the spatial domain (8, 9, 10)
9. Morphological image processing (13)
10. Edge detection (14)
11. Image segmentation (15)
12. Color image processing (16)
13. Feature extraction and representation (18)
14. Visual pattern recognition (19)
Grading Policy: Grades will be determined primarily from the following:

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
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<tbody>
<tr>
<td>Homework and MATLAB assignments</td>
<td>30%</td>
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<tr>
<td>Exam</td>
<td>20%</td>
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<tr>
<td>Term project (MATLAB code + report + oral presentation)</td>
<td>50%</td>
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Important notes:
- For the undergraduate-level (4401) students, the term project will be a guided effort towards implementing a "classical" machine vision solution (e.g., a program that can count objects and recognize their shapes)
- For the graduate-level (5930) students, the term project should target a more challenging contemporary topic and must also comply with additional requirements, including:
  - a detailed literature review of the area associated with the project topic
  - a justification of the novelty and relevance of the chosen topic
  - an IEEE-format paper with the most relevant information from the project report
- Reading assignments will be posted on the Web on a regular basis. Students are expected to read the material to be covered in the lectures ahead of time.
- Submission of assignments, problem sets and projects will be done electronically via Blackboard. No late submission will be accepted.
- All work in this course must be INDIVIDUAL effort unless otherwise specified.
- Changes in class policies and/or office hours may be necessary during the semester and if so the changes will be announced in class and/or in the course home page. It is the student's responsibility to be aware of any such changes.
- When and whether you attend class is up to you. However, you are responsible for all material presented in class.

Course Home Page: A home page containing relevant information and useful links for the course is available at: http://bb9.fau.edu/