Instructor: Dr. Oge Marques  
Dept: CEECS  
Office: SE 420  
Phone: (561) 297-3857  
Email: omarques@fau.edu  
Web: http://faculty.eng.fau.edu/omarques/  
Office Hours: Tuesdays & Thursdays: 1:00-2:30

Catalog description:  
3 Credits  
Study of the interdisciplinary science of vision, combining psychological, neurophysiological, and computational aspects of vision research. Research paper and project topics will be chosen from a list of latest developments in the field.

Prerequisites: Graduate-level status or permission from instructor.

Course goal: To provide a broad and solid conceptual understanding of how visual information can be processed by humans and machines. To understand, model, and simulate human vision mechanisms and appreciate the challenge involved in designing artificial vision systems to achieve comparable goals. To enable students to carry out research on selected topics of interest in this field.


References: Additional books and papers whose details will be provided during the semester.

Course outline:

1. **Introduction to vision science**: visual perception, the human visual system (HVS), selected theories of vision, an interdisciplinary approach to studying vision.
2. **Object detection, recognition, and categorization**: object properties (size, shape, orientation, position) and parts, image segmentation, perception of function, object recognition by human and computer: models and theories, theories of object categorization.
3. **Scenes analysis, recognition, and classification**: region analysis, statistics of natural images, scene recognition by human and computer: models and theories, scene classification: choice of features and examples of applications (indoor vs. outdoor).
4. **Objects in context**: the role of context, contextual priming, theories and models of the interdependence between objects and context.
5. **Visual selection, attention, and saliency**: eye movements, the role of attention, theories and models of visual attention and saliency, novelty detection and rapid scene analysis.
6. **Visual search by human and computer**: models and theories for visual search, bottom-up and top-down factors in visual search, the role of attention, the role of context.
Grading Policy: Grades will be determined primarily from the following:

- **Problem Set:** 30%  
- **Participation Assignments (3 x 10%):** 30%  
- **Term paper or project:** 40%  

- The **Problem Set** will be similar to a take-home exam, essentially a collection of questions related to Topics 1-6 in the class.
- Each **Participation assignment (PA)** will consist of reading a paper and producing a short and insightful summary/critique of its contents.
  - The paper for the first PA will be: Davenport, J. & Potter, M. (2004), 'Scene Consistency in Object and Background Perception', *Psychological Science* 15(8), 559—564.
  - The paper for the second PA will be: Renninger, L. & Malik, J. (2004), 'When is scene identification just texture recognition?', *Vision Research* 44(19), 2301--2311.
  - The paper for the second PA will be announced during the semester.
- The **term paper** will consist of selecting a problem within the scope of the course and choose one of the following two paths:
  - **Path 1**
    - **Goal:** prepare a comprehensive survey paper on a topic of your choice (after getting instructor’s approval) within vision science
    - **Emphasis:** lots of reading and writing
  - **Path 2**
    - **Goal:** prepare a paper reporting experiments using a tool of your choice (after getting instructor’s approval) to test meaningful hypotheses in vision science
    - **Emphasis:** hands-on, possibly with a fair amount of programming

**Important notes:**

- This course will be taught entirely online (via Blackboard and auxiliary tools).
- The video recording of the lectures (recorded during Spring 2009) will be available online.
- All course materials, assignments, slides, papers, etc. will be available on Blackboard.
- Each topic will have a Learning Unit (LU). LLUs encapsulate the topic's contents, lectures, slides, textbook reading, additional (required and optional) reading, and assignments.
- Communication between instructor and students will be primarily through electronic means (email, Blackboard announcements and discussion board, Skype, telephone).
- If necessary, I'll be glad to meet with you in my office.
- Submission of homework assignments must be done electronically [via Blackboard].
- **No email submissions, please!**
- 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.
- For additional questions that might emerge along the semester, please check the FAQs (Frequently Asked Questions) Forum (under 'Discussion Board') on Blackboard.

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