Course Information

Instructor:

Associate Professor Punam K Saha

Office: 3314 SC

Office Hours

Mon 2:30 - 3:30pm,3314 SC

Midterm

To be decided

Lectures:

Mondays and Wednesdays 3:30 - 4:45 PM, 3321 SC

Textbook:

M. Sonka, V. Hlavac, and R. Boyle, Image Processing, Analysis, and Machine Vision, 3rd Ed., Thomson Engineering (now Cengage), 2008.

References:

R.C. Gonzalez and R.E. Woods, Digital Image Processing, 2nd edition, Prentice Hall 2002.

J.S. Walker, A Primer on Wavelets and their Scientific Applications, Chapman & Hall/CRC, 1999.

J.S. Lim, Two-Dimensional Signal and Image Processing, Prentice Hall, 1991.

Handbook of Medical Imaging - Volume 2, Medical Image Processing and Analysis, Editors: M. Sonka, J.M. Fitzpatrick

W.K. Pratt, Digital Image Processing, Wiley Interscience, 3rd ed., 2001.

E.B. Goldstein, Sensation & Perception, Brooks/Cole Publishing Company, 4th ed., 1996.

Poynton, Frequently Asked Questions about Color, ColorFAQ.pdf or ColorFAQ.html

Prerequisites:

55:146 Digital Signal Processing
55:148 Digital Image Processing

Course Goals:

The course is designed to introduce students to advanced theoretical concepts and practical issues associated with image processing. A special effort will be made to develop students' problem solving skills and engineering intuition. New concepts are integrated with students' previous experience through use of systems theory. Upon completion of the course, the student should be knowledgeable and competent in applying the concepts, and should be capable of reading advanced textbooks and research literature in the subject area.

Grades:
Class participation 10%
Midterm 30%
Homework - Projects 60%

Homework-Projects:
Projects requiring 2-4 weeks to complete will be assigned periodically throughout the semester. The due date will be given with each assignment. Late projects will be acepted with a 10% penalty before the projects are posted to the web and a 50% penalty afterward. I encourage students to work together to discuss and solve your homework. However, each student must turn in their own work. Project reports will be submitted electronically as web page reports. Since this is an advanced class, each student will be expected to participate in the lecture discussions.

Academic Misconduct:
The *minimum* penalty for academic misconduct is failure in the course.

Disabilities:
I would like to hear from anyone who has a disability which may require some modification of seating, testing or other class requirements so that appropriate arrangements may be made. Please see me after class or during my office hours.

Sickness:

If you must miss an exam, you should call me before the exam. If I am not in, leave a message. As a rule, makeup exams are to be avoided.

Course News:

Current information about the course will be available on the Advanced Image Processing web page.

Course Syllabus

1. **Color**
2. **Camera models, camera calibration**
3. **Advanced image pre-processing**
   - Scale in image processing
   - Line detection
   - Corner detection
   - Maximally stable extremal regions
4. **Mathematical Morphology**
   - binary
   - gray-scale
   - skeletonization
   - granulometry
   - morphological segmentation
5. **Wavelet theory in image processing**
6. **Image Compression**
7. **Texture**
8. **Image Registration**
   - rigid
   - non-rigid
   - RANSAC