Department of Electrical and Computer Engineering
520.415 Image Processing and Analysis II
Spring 2008

2007-09 Catalog — This course covers fundamental methods for the processing and analysis of images and describes standard and modern techniques for the understanding of images by morphological image processing and analysis, image representation and description, image recognition and interpretation. Laboratory exercises demonstrate key aspects of the course. (3 credit hours)

Prerequisite(s): 520.414 Image Processing and Analysis I

Textbook: R.C. Gonzalez and R.E. Woods, *Digital Image Processing*, Third Edition, Prentice-Hall, Upper Saddle River, New Jersey, 2008

Course Objectives: This course is a continuation of 520.414. It covers fundamental methods for the processing and analysis of images and describes standard and modern techniques for the understanding of images by humans and computers. This second part focuses on nonlinear techniques for image processing and analysis, and more specifically techniques based on Mathematical Morphology. Topics include: binary and grayscale morphological operators (erosions, dilations, openings, and closings), advanced morphological transformations (the discrete size transform, pattern spectrum, morphological skeletons), morphological filtering, morphological image reconstruction, morphological segmentation (SKIZ and the watershed transform), and morphological techniques for multiresolution image analysis.

Topics Covered:
1. Morphological Image Analysis
2. Erosions-Dilations – Adjunctions
3. Secondary Morphological Operators
4. The Hit-or-Miss Operator
5. Other Morphological Operators
6. Discrete Size Transform – Pattern Spectrum
7. Morphological Skeleton
8. Morphological Filtering
9. Optimal Morphological Restoration Filters
10. Morphological Image Reconstruction
11. Morphological Adjunction Pyramids
12. Nonlinear Wavelet Decomposition
13. Linear and Nonlinear Scale-Spaces

Class Schedule: Two – one hour and fifteen minute classes/weekly.

Instructor: John I. Goutsias

Contribution of Course to Meeting the Professional Component (credit hours):

Engineering Science	Engineering Science and Design
3	

Relationship of Course to Program Educational Outcomes (√ those that apply):

x	Apply mathematics, probability and statistics, basic science, and computer science
	Design and conduct experiments, analyze and interpret data
x	Identify, formulate and solve electrical engineering problems
	Use technical skills and modern engineering tools to design to meet needs
	Communicate effectively and work on multidisciplinary teams
	Contemporary issues, ethical responsibilities, environmental, health, safety issues
	Engage in life-long learning

Prepared November 1, 2007 by: John I. Goutsias