

## ELEN E4830 – Digital Image Processing - Spring 2017

**Course Faculty:** Prof. Christine P. Hendon  
Email: cpf2115@columbia.edu  
Office hours: Tuesday, 10:00 AM – 12:00 PM. CEPSR 805

**Teaching Assistants:** TBD  
Email:  
Office hours:

**Credits for course:** 3 Points

**Class Time:** Tuesdays and Thursdays, 8:40 am–9:55 am.

**Location:** TBD

### **Course Text**

*Digital Image Processing 3<sup>rd</sup> Edition*

Rafael C. Gonzalez

Richard E. Woods

### **Course website:**

**Prerequisites:** Signals and systems or equivalent required; Familiarity with probability and linear algebra. Intended for seniors or beginning graduate students.

**Description:** Introduction to theories, algorithms, and practical solutions of digital image/video perception, acquisition, color representation, quantization, transform, enhancement, filtering, multi-spectral processing, restoration, analysis, feature extraction, segmentation, morphological transform, and compression. Students will gain understanding of algorithm design, mathematical tools, and practical implementations of various digital image applications. Considerations of practical system requirements (e.g., medical, satellite, consumer) will be discussed.

### **Grading and evaluation methods**

Problem Sets 25%

Midterm 25%

Second Exam 25%

Project 25%

Problem sets will include both written problems and experimental, where students will implement algorithms in MATLAB. Problem sets are to be submitted online through the course website. The midterm exam will cover the material up to that point. Conflict exams are available for the midterm, but have to be arranged before the examination for students with a valid and documented reason. Make-up examinations will be given the day before the scheduled midterm. The second exam will cover the material after the midterm. Course projects can be carried out in teams of two or individually.

ELEN E4830 Digital Image Processing

Course Schedule (Spring 2017)  
 Instructor: Prof. Christine Hendon

Date	Topic	Reading	Problem Set Assigned	Problem Set Due
Week 1	Course Overview, Digital Image Processing Fundamentals	Chapter 1, 2	PS1 Handed Out	
Week 2	Image Enhancement in the Spatial Domain	Chapter 3		
Week 3	Image Enhancement in the Spatial Domain and Fourier Transform Review	Chapter 3	PS2 Handed Out	PS1 Due
Week 4	Image Enhancement in the Frequency Domain	Chapter 4		
Week 5	Frequency Domain Analysis and Image Restoration	Chapters 4, 5	PS3 Handed out	PS 2 Due
Week 6	Image Restoration	Chapter 5		
Week 7	<b>Review and Midterm Exam</b>			PS 3 Due
Week 8	Wavelets and Multi-resolution Processing	Chapter 7	PS 4 Handed out	
Week 9	<b>No Class Spring Break</b>			
Week 10	Image Compression	Chapter 8	PS 5 Handed out	PS4 Due
Week 11	Morphological Image Processing	Chapter 9		Class Project Proposal Due
Week 12	Image Segmentation and Guest lecture	Chapter 10	PS 6 Handed out	PS5 Due
Week 13	Representation and Object Recognition	Chapter 11, 12		
Week 14	<b>Review and Second Exam</b>			PS6 Due
Week 15	Guest Lecture and 3D Segmentation			
<b>TBD</b>	<b>Final Project Reports and Presentation</b>			