

University of California, Santa Cruz  
Electrical Engineering Department  
EE-293, Spring 2018

### **Image Processing and Reconstruction**

Instructor: **Prof. Sara** Abrahamsson  
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Office Hours: By appointment (email sara@ucsc.edu)

#### **Course Description:**

- This course is being revived and redesigned since it has not been offered in six years. Since the prerequisite for this course has also not been offered for a long time, we are this time waiving the prerequisite. This means that the course will be open also to students with little or no previous experience in image processing. Because of this, it may not be suited for advanced students who already have prior knowledge and experience.
- Students will during this course get both theoretical and hands-on experience with digital image processing and reconstruction. We will also cover basic concepts of optical image formation. Students should after taking this course understand the basic principles of image processing and reconstruction using MATLAB and the free open source software ImageJ/FIJI. Students will also become familiar with the Fourier Transform and spatial filtering.
- This course is spearheading a focus on Optics in the EE department. The course should provide understanding in general signals and systems by providing visual input that is intuitively easy to access. The course will be designed to pair well with the EE course Optics and Microscopy.

**Textbook:** Gonzales and Woods, Image Processing in MATLAB and course handouts.

#### **Homework:**

- Homework will be assigned and collected during class sessions, and will generally follow a weekly sequence; we will work through the solutions on the date of collection; they will not be posted to our class website.
- Grading: Material will consist of problems from lectures, text, supplementary and extra credit problems. To receive full credit, your work must be well organized, written at a college level and show evidence of thoughtful attention to the problem itself. The homework questions are designed to be very similar to the questions on the exams. Grading will follow as described below.
  - A Complete and thoughtful solutions; numerical correctness is not the sole criterion, conceptual

- correctness is. Excellent college level writing.
- **B** Thoughtful solutions displaying clear evidence of attention to each problem but some conceptual errors present.
- **C** Numerically correct result(s) without evidence of conceptual understanding or thoughtful solution.
- **D** Sloppy, incomplete or poorly presented problem set.
- ... to each of the above, + or - as appropriate...

**Examinations:**

- There will be one midterm exam and a comprehensive final exam.
- Unless otherwise stated, Conceptual = 40%; Math = 40% and Exposition=20%. Uniformly distributed mapping will be employed to equate percentages to letter grades:

A+  $\geq$  95; A  $\geq$  85; A-  $\geq$  80; B+  $\geq$  75; B  $\geq$  60;  
 B -  $\geq$  55; C+  $\geq$  50; C  $\geq$  35; C -  $\geq$  30; D+  $\geq$  25; D  $\geq$  10; D -  $\geq$  5

- Grading Letter grades will be assigned for all work. Averaging will follow the usual 4.0 point scale to determine a final grade-point and associated letter grade. Category weightings are as follows:
  - Homework 30%
  - Midterm Exam 20%
  - Project Presentation 20%, passing this presentation is required to pass the class.
  - Final Exam 30% passing this test is required to pass the class.
  - For students who have selected grade pass/no pass: Passing grade will be **B and higher** (not B-)

**Academic Integrity:**

The student-instructor relationship is based on imputed trust. Violations of this trust by deceptively offering the work of others as your own, cheating on examinations etc. will result in formal charges of academic dishonesty being brought against you.

This is a new class at UCSC. Please, help out by reaching out to the instructor at any time if you have input, questions, comments, feedback on the level, content, etc. of the course.