

Course Outline
ECE161C – Signal Processing
Department of Electrical and Computer Engineering
University of California, San Diego

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Spring 2016

This course provides an introduction to image processing and computer vision. We start from the basics of image formation (cameras, light, color), then cover the fundamental concepts in 2D signal processing (2D convolutions, Fourier transforms, etc) and low-level vision (edges, texture), and finally move on to higher level problems such as motion analysis, image segmentation, image classification and retrieval.

Your responsibilities in this class fall into three main categories:

1. Class participation and homework 10%
2. Mid-term 40%
3. Final 50%

Homework: A homework set will be handed out every week. There are some theoretical problems and one computer assignment. The theoretical problems will not be graded. Hand in only the computer problem. Please hand in only the solution, no code listings. Homework should be submitted electronically to the TA.

Exams:

Mid-term: May 5, in class.

Final: June 6, will test all materials covered.

Instructor: Nuno Vasconcelos, EBU1 5602, 4-5550, e-mail: nuno@ece.ucsd.edu

Teaching Assistant: Pedro Maravilha, EBU1 4600, e-mail: pmaravil@ucsd.edu

Office hours: For homework questions see the TA first.

TA Office hours: TBA

Instructor office hours: Friday 9:30-10:30AM.

Pre-requisites: 1-D signal processing, linear algebra

Text:

- D. Forsyth and J. Ponce, *Computer Vision: a modern approach*. Prentice Hall, 2003.

Supplementary hand-outs will be distributed when appropriate. There are various other books of interest. These are not required but can be used for alternative explanations of the material.

1. Jae Lim, *Two Dimensional Signal and Image Processing*, Prentice Hall, 1990.

2. Gonzalez and Woods, *Digital Image Processing*, Addison-Wesley, 2002.
3. Duda, Hart, and Stork, *Pattern Classification*, Wiley, 2001.
4. S. Palmer, *Vision Science*. MIT Press, 1999.

There is a web page for the course, <http://www.svcl.ucsd.edu/~courses/ece161c/>

LECTURE SUBJECT	Number of classes
Introduction	1
Cameras	1
Radiometry	2
Color	1
2D DSP	2
Filtering, smoothing, and noise	1
Edges	1
Edges, interpolation, and templates	1
2D-DFT	2
Discrete Cosine Transform	1
Scale, pyramids, and texture	1
Least squares, model fitting	1
Motion	1
Compression	2