

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

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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 20%
2. Mid-term 35%
3. Final 45%

**Homework:** A homework set will be handed out every week. Homework is due one week after it is issued. No exceptions. You are allowed to collaborate on homework as long as you write your solutions independently and acknowledge the collaboration in the problems where it was used.

**Exams:**

Mid-term: TBA, in class.

Final: finals week, will test all materials covered.

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

**Teaching Assistant:** TBA

**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