Course Descriptor
EE 371R - DIGITAL IMAGE PROCESSING

PROF. AL BOVIK   **UNIQUE NO. 16590**

Topical Outline

1. **Course Introduction.** Imaging Geometry, Image Acquisition, Imaging Devices, Visual Perception, Visual Illusions, Image Representation, Perceptrons.

2. **Basic Binary and Grayscale Image Processing.** Histogram, Morphology, Point Operations, Multilayer Perceptrons.

3. **Discrete Fourier Transform.** Sampling Theorem. Image Frequencies. RBFs and SVMs.

4. **Linear Image Filtering.** Enhancement, and Restoration. Wavelets. ConvNets / CNNs.

5. **Image Denoising.** Nonlinear Denoising Filters. BM3D. Deep Learning. ResNet. Autoencoders.

6. **Lossless and Lossy Image Compression.** BTC. JPEG. Deep Compression.

7. **Image Analysis I.** Image Quality Prediction. Deep Image Quality. Edge Detection.

8. **Image Analysis II.** Superpixels. Visual Search. SIFT. Face Detection.

8. **Image Analysis III.** Models of Visual Cortex. Pattern Analysis. Stereopsis. Deep Stereo.

Prerequisite: Electrical Engineering 351K with a grade of at least C-.

Instructor: Alan C. Bovik, EER 7.862, 471-5370.
Office Hours: 1-2PM Tuesday and Thursday.

TA, Office, Hours: TBD, or by appointment.

Homework: Computer homeworks, Term project (discussed in class).
Exams: Two exams - primarily short answer questions; final exam is comprehensive.
Grading Policy: Term project, 25%; homework, 15%; two exams, 15% each; final exam, 30%.
                Attendance is not part of the grade.

Required Texts:
(1) Lecture Notes, available on the Web.
(2) A.C. Bovik, *The Essential Guide to Image Processing,* Academic Press, 2009.

Grading

Plus and minus grades will not be assigned for the final letter grades.

Discussion of homework questions amongst students is encouraged. Please submit your own independent homework solutions.

Late assignments will not be accepted except by consent of instructor.

University Honor Code

"The core values of The University of Texas at Austin are learning, discovery, freedom, leadership, individual opportunity, and responsibility. Each member of the University is expected to uphold these values through integrity, honesty, fairness, and respect toward peers and community."
http://www.utexas.edu/about-ut/mission-core-purpose-honor-code

Religious Holidays

By UT Austin policy, you must notify the instructor of any pending absence at least fourteen (14) days prior to the date of observance of a religious holy day, or on the first class day if the observance takes place during the first fourteen days of the semester. If you must miss class, lab section, exam, or assignment to observe a religious holiday, you will have an opportunity to complete the missed work within a reasonable amount of time after the absence.

College of Engineering Drop/Add Policy

The Dean must approve adding or dropping courses after the fourth class day of the semester.

Students with Disabilities

UT provides upon request appropriate academic accommodations for qualified students with disabilities. Please contact Office of Dean of Students at 471-6259 or ssd@uts.cc.utexas.edu.

Classroom Evacuation for Students

All occupants of university buildings are required to evacuate a building when a fire alarm and/ or an official announcement is made indicating a potentially dangerous situation within the building.

Familiarize yourself with all exit doors of each classroom and building you may occupy. Remember that the nearest exit door may not be the one you used when entering the building.

If you require assistance in evacuation, inform your instructor in writing during the first week of class.

For evacuation in your classroom or building:

1. Follow the instructions of faculty and teaching staff.
2. Exit in an orderly fashion and assemble outside.
3. Do not re-enter a building unless given instructions by emergency personnel.