ESE 558 DIGITAL IMAGE PROCESSING
Electrical and Computer Engineering, Stony Brook University, 3 Credits
Prof. Murali Subbarao
(Subject to minor revisions)

Catalog description:
It covers digital image fundamentals, mathematical preliminaries of two-dimensional systems, image transforms, human perception, color basics, sampling and quantization, compression techniques, image enhancement, image restoration, **image reconstruction from projections,** and binary image processing.

Text book:
1. *Digital Image Processing,*
   R. C. Gonzalez and R. E. Woods, Third Edition,
   Pearson Prentice-Hall, ISBN 0-13-168728-x, 2008.

Reference Material:
Published Papers, Patents, Handouts, online resources.

Contact info:
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Office Hours: Tue. and Thu.: 10 a.m to 11.00 a.m. and 1 pm to 2 pm.
Place: Room 233, Light Engg. Bldg.

Syllabus:
1. Introduction
2. Digital Image Fundamentals
3. Image Enhancement: Spatial domain techniques
4. Image Enhancement: Fourier domain techniques
5. Sampling and quantization
6. Image Reconstruction from Projections:
   a. X-ray computed tomography (CT)
   b. SPECT/PET (Single-Photon/Positron Emission CT)
   c. MRI (Magnetic Resonance Imaging)
7. Image Restoration and Shift-Variant Image Filtering and Restoration.
8. Color Image Processing
9. Image Compression

GRADING
Attending lectures is essential for doing well on written exams. Lectures will specifically prepare students for the exams. There will be three tests.

Test 1 : 32% (2 hrs)   (50% open book)

Test 2 : 33% (2 hrs)   (50% open book)

Final : 10% (1 hr.)   (50% open book

Individual Programming Project: 15%.
Matlab/Mathematica/Octave programming language should be learned for completing the project. Project is not difficult and requires about 12 hours of effort.

Student Presentation: 10%.
Each student will read a published paper on a medical imaging topic and present it to class. You will need to prepare around 6 slides and present it for 6 minutes. Estimated effort: about 10 hours.

Grades are assigned based on absolute percentage of total marks as below.
This policy is subject change.

A : 91—100 , A- : 86—90 , B+ : 81—85, B : 76—80, B- : 71--75
C+ : 68—70, C : 64—67, C- : 61—63, D+ : 56—60, D : 51—55, F : 0—50