Bioengineering 280A: Principles of Biomedical Imaging
Fall Quarter 2013

Revised Syllabus

Week 1
Monday 9/30  Course Policies; Overview of Imaging Modalities
Wednesday 10/2  X-rays: Basic Physics; Contrast; Source and object magnification.

Week 2
Monday 10/7  X-ray imaging solution; Delta functions and signal expansions; impulse response.
Wednesday 10/9  Review Signal Expansions; Linearity; Superposition; Shift Invariance; Convolution

Week 3
Monday 10/14  X-ray imaging equation; Begin CT;
Wednesday 10/16  Radon Transform; Backprojection; Begin Fourier Transforms;

Week 4
Monday 10/21  Fourier Transform theorems; Modulation Transfer Function.
Wednesday 10/23  Convolution Theorem; CT: Projection Slice Theorem;

Week 5
Monday 10/28  Filtered back projection; Sampling: 1D and 2D sampling, Whitaker-Shannon sampling theorem, aliasing; Application to CT
Wednesday 10/30  MRI: Overview, Basic physics, Bloch Equation

Week 6
Monday 11/04  MRI: Gradients, Signal Equation, Spin-warp pulse sequence
Wednesday 11/06  MRI: Sampling and Windowing; Pulse sequence Design

Week 7
Monday 11/11  NO CLASS; Veteran’s Day Holiday
Wednesday 11/13  MRI: Slice selection; RF pulse design

Week 8
Monday 11/18  In-class Exam
Wednesday 11/20  MR Image Contrast and Pulse Sequence Parameters

Week 9
Monday 11/25  Diffusion Imaging [L. Frank]
Wednesday 11/27  Imaging of Flow and Motion; Cardiac Imaging [E. Wong]

Week 10
Monday 12/02  Functional Brain Imaging [R. Buxton]
Wednesday 12/04  Imaging of Brain Connectivity

Week 11
Finals Week  Project Presentations from 11:30 am to 2:30 pm
Tuesday 12/10