

**Preliminary Syllabus**

**Week 1**

Monday 9/28  
Wednesday 9/30

Course Policies; Overview of Imaging Modalities  
X-rays: Basic Physics; Contrast; Source and object magnification.

**Week 2**

Monday 10/5  
Wednesday 10/7

X-ray imaging solution; Delta functions and signal expansions; impulse response.  
Review Signal Expansions; Linearity; Superposition; Shift Invariance;  
Convolution

**Week 3**

Monday 10/12  
Wednesday 10/14

X-ray imaging equation; Intro to Computed Tomography (CT)  
Radon Transform; Backprojection; Intro to Fourier Transforms

**Week 4**

Monday 10/19  
Wednesday 10/21

Fourier Transform theorems; Modulation Transfer Function.  
Convolution Theorem; CT: Projection Slice Theorem;

**Week 5**

Monday 10/26  
Wednesday 10/28

Filtered back projection; Sampling: 1D and 2D sampling, Whitaker-Shannon  
sampling theorem, aliasing; Application to CT  
MRI: Overview, Basic physics, Bloch Equation

**Week 6**

Monday 11/2  
Wednesday 11/4

MRI: Gradients, Signal Equation, Spin-warp pulse sequence  
MRI: Sampling and Windowing; Pulse sequence Design

**Week 7**

Monday 11/9  
Wednesday 11/11

In-class Exam  
**NO CLASS Veteran's Day Holiday**

**Week 8**

Monday 11/16  
Wednesday 11/18

MRI: Image Contrast and Pulse Sequence Parameters  
MRI: Slice selection; RF pulse design

**Week 9**

Monday 11/23  
Wednesday 11/25

Vascular Imaging  
Diffusion Imaging

**Week 10**

Monday 11/30  
Wednesday 12/2

Functional Brain Imaging  
Special Topic TBD

**Week 11**

Finals Week  
Tuesday 12/8

Project Presentations from 11:30 am to 2:30 pm