

Bioengineering 208: Magnetic Resonance Imaging Laboratory
 Winter 2007
SYLLABUS

Week	Lecture	Lab
1	MRI Review Slice Selection Hardware Overview Quadrature Detection	Scanner Safety Scan and reconstruct image from raw data Calculate slice profile from image data Calculate B1 map from image data Generate quadrature ghosts
2	2D spinwarp pulse sequence Basic scan parameters Image contrast: T1, T2, PD Image SNR	Generate T1, T2, and PD maps
3	Coherence Pathways CPMG and non-CPMG echoes SPGR vs FLASH vs SSFP	CPMG and non-CPMG echoes SPGR vs FLASH vs SSFP
4	Echo Planar Imaging Bandwidth anisotropy Off Resonance Sensitivity Nyquist ghosts – reference scans T2* limited PSF	Estimation of field map from EPI distortion T2* Blurring in EPI
5	MRI artifacts and SNR Data clipping Gibbs Ringing Image Wraparound Motion Chemical Shift Quadrature ghosting	Chemical Shift Image SNR
6	MR angiography Phase contrast Time of flight	Compare flow velocities measured using TOF and PC MRA Calculate and compare total blood flow into and out of brain
7	RF coil design Classes of coils Design criteria Reciprocity Coil loading Dielectric resonance	Build your own coil and use it to scan Compare predicted and measured field profiles
8	Arterial Spin Labeling Pulsed ASL Continuous ASL Velocity Selective ASL	Comparison of pulsed and pseudo-continuous ASL Combined ASL/BOLD fMRI
9	Special Topics	Final Project
10	Special Topics	Final Project