

Bioengineering 208: Magnetic Resonance Imaging Laboratory
 Winter 2008

Syllabus

Week	Lecture	Lab
1	MRI Review Hardware Overview Quadrature Detection	Scanner Safety Scan phantom and reconstruct image from raw 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	TBA
3	Gradient echo imaging SPGR vs FLASH vs SSFP Ernst Angle Frequency dependence	TBA
4	Echo Planar Imaging Bandwidth anisotropy Shimming Nyquist ghosts T2* limited PSF	Estimation of field map from EPI distortion Comparison with conventional field map
5	Parallel Imaging	Collect data with coil array and reconstruct
6	Artifacts and SNR	TBA
7	MR angiography Phase contrast Time of flight	Calculate and compare total blood flow into and out of brain
8	RF coil design Classes of coils Design criteria Reciprocity Coil loading Dielectric resonance	Build your own coil and use it to scan Demonstrate coil coupling
9	Arterial Spin Labeling Pulsed ASL Continuous ASL Velocity Selective ASL	Comparison of ASL data with theoretical signal equations
10	Special Topics	Final Project