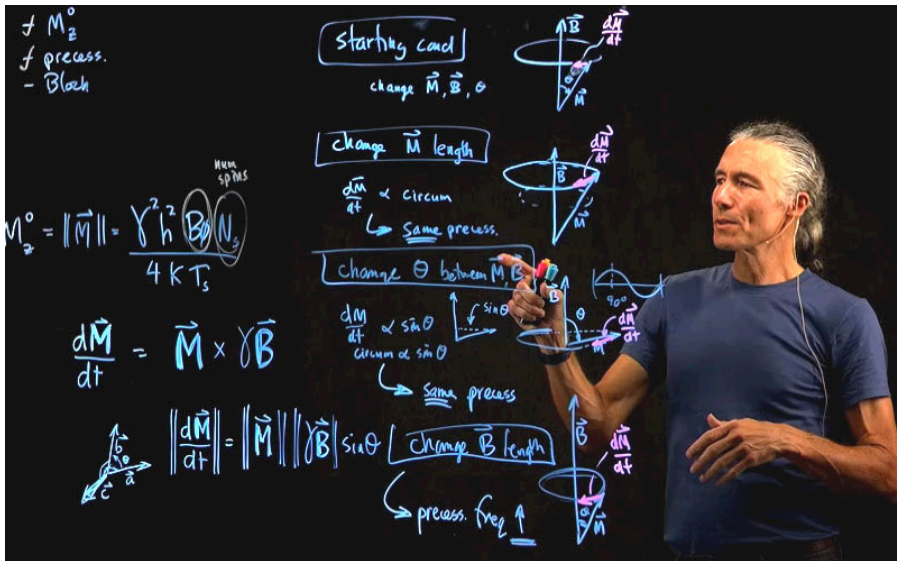


PSY 569/769: Foundations of Neuroimaging

Professor Marty Sereno
Fall Semester 2019



I am delighted to offer an ongoing SDSU course on the foundations of neuroimaging.

I direct the SDSU Imaging Center sited in the north campus Engineering and Interdisciplinary Sciences Complex, which houses a 3T research-dedicated MRI magnet (Siemens Prisma).

Have you wondered how imaging using MRI *really* works? Or how electrical signals measured on the scalp are generated or localized? Do you want to

learn how to reconstruct your own cortical surface? (to inflate it, 3D-print it, or animate it to impress your friends :-}). Or maybe you've always wanted to *really* understand how the Fourier transform relates to MRI.

If so, this class is for you! It will take you through the background needed to deeply understand how modern neuroimaging works at a pace that you *will* be able to keep up with. We go a little slower than a typical engineering course, but we won't skimp on the math.

This course uses a live Learning Glass lecture recording system, which makes reviewing the tricky parts a snap. This wide-ranging course is designed to train students to:

- explain precession/excitation/recording/contrast of magnetic resonance signals and echoes using the Bloch equation
- compute Fourier transform, use it to explain RF excitation, gradients, signals generate k-space data, and understand how reconstruction works
- diagram main classes of anatomical/functional pulse sequences
- understand diffusion, perfusion, and spectroscopic pulse sequences
- understand the mathematics behind the generation/localization of EEG/MEG signals, cortical surface-based methods, and how to combine them w/fMRI
- *NEW in 2019*: identification of brain structures, contrast types in projected slices

This class is designed for and may be of interest to upper-division undergraduate and graduate students in *psychology, biology, computer science, engineering, physics, and philosophy*. There are two take-home MATLAB problem set midterms and a final paper (undergraduate 5 pages, graduate 10 pages). Graduate students attend all lectures, but also attend a graduates-only session. Undergraduates and graduates will be graded on independent scales.

For more info, contact Dr. Marty Sereno at: msereno@sdsu.edu

Prerequisite: PSY 101 and/or permission of the instructor.

Time and Place: MWF 9:00–9:50 AM, SSW 2667 (Learning Glass Studio)

Syllabus: <https://mri.sdsu.edu/sereno/596i>