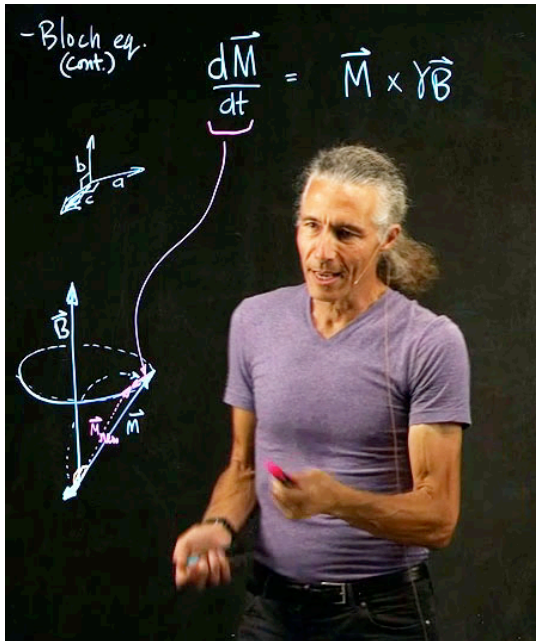


# PSY 596: Foundations of Neuroimaging

Professor Marty Sereno  
Fall Semester 2018



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

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

Have you ever wondered how neuroimaging 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 on youtube :-} ). Or maybe you've always wanted to *really* understand how the Fourier transform relates to MRI, to impress your friends and be the life of the party.

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 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 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

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, and have a short final paper. Undergraduates and graduates will be graded on independent scales.

**For more info, contact Dr. Marty Sereno at:** [msereno@sdsu.edu](mailto: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: <http://mri.sdsu.edu/sereno/596i>