<u>Readings Spring 2017: Large Data Sets and Large-Scale Neuroscience</u>

Time: 5-7:30 PM
Dates: Thursdays from January 26 to May 25
Location: Skirball 5th Floor Conference Room

Course Director: Robert Froemke (robert.froemke@med.nyu.edu; 212-263-4082)

Course Objective and Description: Technological advances in computation are enabling scientific studies on a much larger scale. These developments include increased storage, better algorithms for computer vision, crowd-sourcing, affordable whole-genome sequencing, multi-color imaging, and wide-field optics, among others. This has led to large-scale projects such as the BRAIN Initiative and the Blue Brain/Human Brain Project. How are these methods and initiatives changing our field?

This readings course will essentially be a journal club, with each week focusing on one or two papers on topics such as connectomics, genomics, whole-organism imaging, large-scale modeling, and behavioral analysis. Example papers include:

Helmstaedter et al., Nature 2013: Connectomic reconstruction of the inner plexiform layer in the mouse retina.
Morgan et al., Cell. 2016: The fuzzy logic of network connectivity in mouse visual thalamus.
Yuen et al., Nature Medicine 2015: Whole-genome sequencing of quartet families with autism spectrum disorder
Ahrens et al. Nature 2012: Brain-wide neuronal dynamics during motor adaptation in zebrafish.
Markram et al., Cell 2015: Reconstruction and simulation of neocortical microcircuitry.
Shemesh et al., Elife 2013: High-order social interactions in groups of mice.
Alivisatos et al., Science 2013: The brain activity map.
Marder, PLoS Biol 2015: Understanding brains: details, intuition, and big data.

Course Requirements: Throughout the course, participants are expected to read each primary paper, attend each class and participate in group discussions. Each student will lead the discussion for 2-3 classes (depending on number of students).