

Advanced fMRI Course

Organizers:

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Functional magnetic resonance imaging (fMRI) has taken a central role in the study of human brain function. fMRI is inherently transdisciplinary, and data acquisition and analysis are constantly evolving. Thus, there is a need for continuing education on new methods and cutting-edge neuroscientific applications of fMRI. This course addresses this need and is intended for an audience of research scientists with intermediate to advanced knowledge of fMRI techniques, who wish to extend the breadth and depth of their understanding of the current state of the art.

This year's course covers cutting-edge theory and research in a spectrum of topics critical for fMRI acquisition and analysis. This includes the physics and physiology of fMRI, best-practice statistical approaches, computational model- and pattern-based approaches to fMRI analysis, and new developments in connectivity and causal modeling.

Learning Objectives:

The course is designed to develop participants' understanding of:

1. The physics and physiology underlying fMRI;
2. The potential and limitations of fMRI;
3. Statistical brain mapping techniques, including advanced analyses of connectivity, causality, and pattern information;
4. Computational modeling of brain information processing and its integration into the analysis of fMRI data.

Target Audience:

This course addresses the need for continuing education on new methods and cutting-edge neuroscientific applications of fMRI. It is intended for an audience of research scientists with intermediate to advanced knowledge of fMRI techniques, who wish to extend the breadth and depth of their understanding of the current state of the art.

Course Schedule

8:00 – 8:30

Experimental design for fMRI

Thomas Liu, University of California, San Diego, CA, United States

8:30 – 9:00

Imaging at high spatial and temporal resolution: Emerging directions

Lawrence Wald, PhD, Massachusetts General Hospital, Charlestown, MA, United States

9:00-9:30

Advances in fMRI acquisition, and how to take advantage of them

Karla Miller, University of Oxford, Oxford, United Kingdom

9:30-10:00

Advances in physiological noise modeling

Rasmus Birn, University of Wisconsin-Madison, Madison, WI, United States

10:00 – 10:30

Break

10:30 – 11:00

Multimodal imaging: Combining fMRI and EEG

Mark Cohen, University of California Los Angeles, Los Angeles, CA, United States

11:00-11:30

Advances in thresholding and multiple comparisons

Thomas Nichols, University of Warwick, Dept. of Statistics, Coventry, United Kingdom

11:30 – 12:00

Bayesian linear models for fMRI

William Penny, University College London, London, United Kingdom

12:00 – 13:00

Lunch

13:00-13:30

Combining ICA and prediction to improve translation

Vince Calhoun, The Mind Research Network and UNM, ALBUQUERQUE, NM, United States

13:30-14:00

Modeling change points in fMRI: Activation and dynamic connectivity

Martin Lindquist, Columbia University, New York, United States

14:00-14:30

Pattern information analysis and human neuroscience

Dwight Kravitz, NIH, Bethesda, United States

14:30-15:00

Fundamentals of dynamic causal modeling

Rosalyn Moran, University College London, London, United Kingdom

15:00-15:30

Break

15:30-16:00

Dynamic causal models for prediction

*Klaas Enno Stephan, Translational Neuromodeling Unit, Inst. for Biomedical Engineering, Univ. of Zurich
& ETH Zurich, Zurich, Switzerland*

16:00-17:00

Questions and Discussion