MINT WORKSHOP 2020 ANN ARBOR

Application is now OPEN. Apply here by Friday, January 24th.
https://mint.engin.umich.edu/workshop/

We are inviting approximately 20 members of the neuroscience community to join us for a 5-day course on our campus in Ann Arbor from May 11-15th, 2020. The MINT Workshop will be heavily subsidized by the NSF. Participants will only be responsible for the transportation costs and their dinners. Registration and supplies are graciously provided by NSF NeuroNex.

Applicants can request 1 of 2 tracks, either Brainbow/Clarity/Expansion microscopy or Optoelectrode/ePhys. See the workshop descriptions below for learning objectives and select your preferred track in the application. We expect to inform all applicants by February 17th, 2020 whether there was space for accommodation.

PRELIMINARY SCHEDULE

TRACK 1: Brainbow/Clarity/Expansion Micro (10-15 available positions)	**TRACK 2: Optoelectrode/Ephys Micro (4-6 available positions)**
Preparation **Trainees inject Brainbow AAV samples before workshop and ship sections**	None
MONDAY EVENING	**MONDAY EVENING**
6:00 pm **Introduction Meeting and Lecture**	6:00 pm **Introduction Meeting and Lecture**
TUESDAY MORNING	**TUESDAY MORNING**
Breakfast provided	*Breakfast provided*
8:00 am **Tissue Crosslinking; Brainbow+nTracer Lecture; Tissue Incubation With Expansion Gel Monomer**	**8:00 am Introductory Lecture (1 hours) +Acute OptoePhys Surgery & Demo**
Noon *Lunch provided*	Noon *Lunch provided*
AFTERNOON	**AFTERNOON**
1:00 pm **Tissue Gelling Hands-on Imaging on Confocal Microscope**	1:00 pm **Acute OptoePhys Surgery & Demo**
5:00 pm *Dinner and evening on your own*	5:00 pm *Dinner and evening on your own*
EVENING	
7:00 pm **Brainbow ExM+Microscopy Lecture: Tissue Digestion**	
WEDNESDAY MORNING	**WEDNESDAY MORNING**
Breakfast provided	*Breakfast provided*
8:00 am **Primary Antibody and Imaging**	8:00 am **Hands-on Chronic Opto-ePhys Training**
Noon *Lunch provided*	Noon *Lunch provided*
AFTERNOON	**AFTERNOON**
1:00 pm **More imaging Training**	1:00 pm **Electrode/Ephys Principles**
5:00 pm *Dinner and evening on your own*	5:00 pm *Dinner and evening on your own*
THURSDAY MORNING	**THURSDAY MORNING**
Breakfast Provided	*Breakfast Provided*
8:00 am **Secondary Antibody and More imaging**	8:00 am **Microdrive Assembly and Chronic Surgery Prep**
Noon *Lunch provided* – **Survey and Discussion**	Noon *Lunch provided* – **Survey and Discussion**
AFTERNOON	**AFTERNOON**
1:00 pm **Imaging Group 5**	1:00 pm **Hands-on Chronic Opto-ePhys Training**
5:00 pm *Dinner and evening on your own*	5:00 pm *Dinner and evening on your own*
EVENING	
6:00 pm **Tissue Expansion+Mounting**	

FRIDAY MORNING

Breakfast provided

8:00 am **U-M lab tours if requested (BOTH TRACKS)**
Trainees take back their expanded Brainbow samples back to their own lab to image and trace

LEARNING OBJECTIVES

Electrodes

- State-of-the-art microelectrode technology
- Electroplating options and performance
- Electrode characterization
- Usefulness of polytrode design
- Available spike sorting software and performance
- Impedance spectroscopy
- Cyclic voltammetry
- Electrode voltage transients

Optogenetic ePhys

- Build/prepare a microdrive
- Mount probes onto drives (including additional dummy probes for initial practice)
- Place animals in stereotaxic frame, prepare skull, and perform a craniotomy using a trephine burr
- Insert optoelectrodes into brain
- Craniotomy closure and shielding
- Connect animals to a setup and demonstrate optical stimulation/electrical recording

Clarity

Lecture Components

- Theory of tissue clearing (brain and skull) using CLARITY and variants
- Theory of tissue labeling modalities: endogenous labeling, IHC, HCR
- Theory of imaging, visualization

Lab Components

- Performance of CLARITY-based tissue clearing (PACT)
- DUAL PACT + protein labeling (IHC)
- Implementation of HCR-based RNA labeling
- Imaging pre-prepared cleared bone and multicolored labeled samples
- Imaging of MINT lab-prepared PACT tissues, HCR-labeled tissues

Brainbow

- Principle of digital image processing
- nTracer practice

AAV

- Theory of AAVs
- Discovery of novel caspids, e.g., AAV-PHP .eB and PHP.s, and their performance crossing BBB
- Applications: morphology, mapping, Ca imaging, activity pertubation (opto and chemicogenetics)
- Production protocol: 3 plasmid transfection (gene cargo, caspid, pHelper), harvest, purify, titer
- Delivery protocol: retro-orbital injection, assessment of gene expression, targeting strategies
- Provide a list of resources