

NEUROBIOLOGY COURSE SYLLABUS 2019

June 11 – August 3

Directors:

| | |
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| Diana Bautista | UC Berkeley (dbautista@berkeley.edu) |
| Marc Hammarlund | Yale University (hammarlund@gmail.com) |
| Ellen Lumpkin | Columbia University (ellen.a.lumpkin@gmail.com) |

Course Manager:

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| Scott Alpizar | Scott.A.Alpizar.GR@dartmouth.edu |
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Course Assistants:

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|---------------|-----------------------|
| Ricardo Silva | r.silva@berkeley.edu |
| Joanah Ajayi | ajayijoanah@gmail.com |

Students:

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| Christopher Arp | Graduate Student | New York University |
| James Baldassano | Graduate Student | Univ. of Maryland, College Park |
| Wassim Elkhatib | Graduate Student | University of Toronto Mississauga |
| Chloe Emerson | Graduate Student | Yale University |
| Koral Goltseker | Graduate Student | Tel Aviv University |
| Stephen Lee | Graduate Student | Columbia University |
| Sophie Miller | Graduate Student | California Institute of Technology |
| Douglas Miller | Graduate Student | University of Florida |
| Maria Del Pilar Miranda Vergara | PostDoc | Max Planck Inst. for Biology of Ageing |
| Tyler Ogunmowo | Graduate Student | The Johns Hopkins School of Medicine |
| Alexandra Ortiz Rosa | Graduate Student | Institute of Neurobiology |
| Irene Pallucchi | Graduate Student | Karolinska Institute |
| Olivia Pedroncini | Graduate Student | Biomedicine Research Institute of Buenos Aires |
| Renee Pepper | Graduate Student | University of Tasmania |
| Christine Prater | PostDoc | Texas Tech University |
| Scott Susi | Graduate Student | Brown University |
| Taylor Yeater | Graduate Student | University of Florida |

Meet and Greet: June 11

7:00 pm – Meet with course directors, managers, and assistants. Discuss expectations, MBL Club
7:30 – 9:00pm – Meet and Greet with Electrophysiology Faculty, Section Introduction. MBL Club
(Food Provided)

First Day: June 12

9:00 am – Meet in Loeb G70S. Section Introduction; MBL orientation.

General Daily Schedule

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| 9:00am – 11:00am: | Lecture, in Loeb G70S |
| 11:00am – 12:00pm: | Laboratory prep |
| 12:00pm – 2:00pm: | Lunch/ Free time |
| 2:00pm – 6:00pm: | Lab |
| 6:00pm – 8:00pm: | Dinner/Free time |
| 8:00pm – Midnight: | Lab/analysis/seminars |

Neuronal Excitability & Electrophysiology (6/11 - 6/28)

Section Head: Ricardo C. Araneda, Associate Professor, University of Maryland

Section Description: The objective of the electrophysiology section is to learn electrophysiology from first principles to practical application. Students will receive lectures from leading scientists that range from the basics of whole cell recordings to ion channel structure/function to the molecular basis and modulation of synaptic transmission. Students will rotate through a series of experimental preparations that include the invertebrate neuromuscular junction, single channel recording and analysis in cultured cells, whole cell currents in cultured cells, and in vivo patch clamp recordings in tissue slices and intact central nervous system. Rotations will be followed by independent research projects. These projects will be short, original research projects designed and executed under the guidance of individual teams of faculty and TAs. The goal is to attain a basic understanding of the theory and application of a wide range of modern electrophysiological techniques and the application of these techniques toward solving outstanding questions in modern neuroscience.

Faculty:

| | | |
|---------------------|----------------------------|---------------------------------------|
| Ricardo Araneda | University of Maryland | araneda@umd.edu |
| Carlos Aizenman | Brown University | Carlos_Aizenman@brown.edu |
| Diana Bautista | UC Berkeley | dbautista@berkeley.edu |
| Ian Davidson | Boston University | idavison@bu.edu |
| Ellen Lumpkin | Columbia University | ellen.a.lumpkin@gmail.com |
| Martin Mueller | University of Zurich | martin.mueller@imls.uzh.ch |
| Rebecca Piskorowski | Université Paris Descartes | rebecca.piskorowski@parisdescartes.fr |
| Jon Sack | UC Davis | jsack@ucdavis.edu |

Teaching Assistants:

| | | |
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| Ruilong Hu | Team Araneda | hu.ruilong@gmail.com |
| Pablo Villar | Team Araneda | pvillardr@gmail.com |
| Adrian Thompson | Team Aizenman | adrian_thompson@brown.edu |
| Raul Ramos | Team Lumpkin | rramos@brandeis.edu |
| Sonali Mali | Team Lumpkin | smali@berkeley.edu |
| Spencer Byers | Team Davidson | byerss@bu.edu |
| Igor Delvendahl | Team Mueller | Igor.Delvendahl@uzh.ch |
| Sadiyah Cassim | Team Piskorowski | sadiyah.cassim54@gmail.com |
| Robert Stewart | Team Sack | rbnstewart@ucdavis.edu |

Special Lecturers:

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| David Anderson | CalTech | |
| Bruce Bean | Harvard University | bruce_bean@hms.harvard.edu |
| Henry Colecraft | Columbia University | hc2405@cumc.columbia.edu |
| Rod MacKinnon | Rockefeller University | mackinn@mail.rockefeller.edu |
| Adair Oesterle | Sutter Instruments | adair@sutter.com |
| Beth Stevens | Harvard University | Beth.Stevens@childrens.harvard.edu |

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| June 12 – Wed | 9:10-11:00 | Lecture: Jon Sack <i>Voltage Clamp Electrophysiological Recording</i> |
| | 11:30-12:30 | MBL Orientation |
| | 12:30-2:30 | Lunch/Free Time |
| | 1:30-2:30 | Model Cell Demo |
| | 2:30-3:00 | Professional Skills Micro Course |
| | 3:00-5:30 | Rotation #1 |
| | 5:30-7:00 | Dinner/Free Time (TBD by Rig) |
| | 7:00-12:00 | Rotation #1 |
| June 13 – Thur | 9:00-11:00 | Lecture: Bruce Bean <i>Microscopic Currents, Action Potential</i> |
| | 11:00-6:00 | Rotation #2/Lunch (Hours TBD by Rig) |
| | 6:00-7:00 | Dinner/Free Time |
| | 7:00-12:00 | Rotation #3 (Hours TBD by Rig) |
| June 14 – Fri | 9:00-11:00 | Lecture: Rod MacKinnon <i>Ion Channels: Structure and Function</i> |
| | 11:00-6:00 | Rotation #4/Lunch (Hours TBD by Rig) |
| | 6:00-7:00 | Dinner/Free Time |
| June 15 – Sat | 9:00-1:00 | Rotation #6 |
| | 1:00-2:00 | Lunch/Free Time |
| | 2:00-3:00 | Glass Micropipette Tutorial -- Adair Oesterle |
| | 3:00-4:00 | Softball Meeting |
| | 4:00-6:00 | Happy Hour @ Ricardo's |
| | 6:00-8:00 | Dinner/Free Time |
| June 16 – Sun | DAY OFF | |
| June 17 – Mon | 9:00-12:00 | Rotation #7 |
| | 12:00-2:00 | Lunch/Free Time (TBD by Rig) |
| | 2:00-4:00 | Rotation #7 |
| | 2:00-6:00 | Project Discussions |
| | 6:00-8:00 | Dinner/Free Time |
| | 8:00-9:00 | Monday Night Lecture: Henry Colecraft <i>Towards More Precise Voltage-Gated Calcium Channel Inhibitors</i> |
| | 9:30 | Reception/JAR OF DESTINY |
| <i>12-Jun</i> June 18 – Tues | 9:00-10:00 | Lecture: Ellen Lumpkin <i>Mechanosensation</i> |
| | 10:30-11:30 | Workshop: Diana Bautista <i>TRP Channels in Sensory Transduction</i> |
| | 11:30-2:00 | Lunch/Free Time |
| | 2:00-6:00 | Projects Day1 |
| | 6:00-8:00 | Dinner/Free Time |
| | 8:00-12:00 | Projects Day 1 |

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| June 19 – Wed | 9:00-11:00 | Lecture: Ricardo Araneda <i>Chemosensation/Neuromodulation</i> |
| | 11:00-12:00 | Projects Day 2 |
| | 12:00-2:00 | Lunch/Free Time |
| | 2:00-6:00 | Projects Day 2 |
| | 6:00-7:00 | Dinner/Free Time |
| | 7:00 | Nano Project Presentations |
| June 20 – Thur | 9:00-11:00 | Lecture: Martin Mueller <i>Presynaptic Mechanisms and Calcium Signaling</i> |
| | 11:00-12:00 | Projects Day 3 |
| | 12:00-2:00 | Lunch/Free Time |
| | 2:00-6:00 | Projects Day 3 |
| | 6:00-8:00 | Dinner/Free Time |
| | 8:00-12:00 | Projects Day 3 |
| June 21 – Fri | 9:00-11:00 | Lecture: Rebecca Piskorowski <i>Dendritic Integration</i> |
| | 11:00-12:00 | Projects Day 4 |
| | 12:00-2:00 | Lunch/Free Time |
| | 2:00-6:00 | Projects Day 4 |
| | 6:00-8:00 | Dinner/Free Time |
| | 8:00-12:00 | Projects Day 4 |
| June 22 – Sat | DAY OFF | |
| June 23 – Sun | DAY OFF | |
| June 24 – Mon | 9:00-11:00 | Lecture: Ian Davidson <i>Principles of Cortical Circuits</i> |
| | 11:00-12:00 | Projects Day 5 |
| | 12:00-2:00 | Lunch/Free Time |
| | 2:00-6:00 | Projects Day 5 |
| | 6:00-8:00 | Dinner/Free Time |
| | 8:00-10:00 | Kravitz Lecture: Beth Stevens <i>How Immune Cells Wire and Unwire Neural Circuits</i> |
| June 25 – Tues | 9:00-11:00 | Lecture: Carlos Aizenman <i>Development of Neural Circuits</i> |
| | 11:00-12:00 | Projects Day 6 |
| | 12:00-2:00 | Lunch/Free Time |
| | 2:00-6:00 | Projects Day 6 |
| | 6:00-8:00 | Dinner/Free Time |
| | 8:00-12:00 | Projects Day 6 |

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| June 26 – Wed | 9:00-12:00 | Projects Day 7 |
| | 12:00-2:00 | Lunch/Free Time |
| | 2:00-6:00 | Projects Day 7 |
| | 6:00-8:00 | Dinner/Free Time |
| | 8:00-10:00 | NS&B Lecture: Nicholas Bellono <i>Molecular and Cellular Mechanisms of Sensory Adaptation</i> |
| June 27 – Thur | 9:00-11:00 | Lecture: David Anderson <i>Neural Control of Aggression and Defense in Flies and Mice</i> |
| | 11:00-12:00 | Project Presentation Prep |
| | 12:00-2:00 | Lunch/Free Time |
| | 2:00-6:00 | Project Presentation Prep |
| | 6:00-8:00 | Dinner/Free Time |
| | 8:00-12:00 | Project Presentation Prep |
| June 28 – Fri | 9:00-11:30 | Project Presentation Prep |
| | 11:30-1:00 | Lunch/Free Time |
| | 1:00-3:00 | Project Presentations |
| | 3:00-6:00 | Free Time |
| | 6:00 | Cycle Change Party MBL Club Costume Party (Catered) |
| June 29 – Sat | DAY OFF | |
| June 30 – Sun | DAY OFF | |

Imaging Neural Activity (7/1 - 7/13)

Section head: Darcy Peterka, Columbia University

Section Description: The objective of the imaging section will be to learn how to use the tools of modern microscopy to answer questions in neuroscience. Students will receive lectures from leading scientists on topics ranging from the first principles of optics and the nature of light to super-resolution light microscopy and electron microscopy. Students will design and execute original research projects under the guidance of individual teams of faculty and TAs.

Faculty:

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|-------------------------------|--------------------------|----------------------------|
| Marc Hammarlund | Yale University | hammarlund@gmail.com |
| Michael Higley | Yale University | m.higley@yale.edu |
| Michael Hoppa | Dartmouth College | hoppam@gmail.com |
| Erik Jorgensen | University of Utah | erik.m.jorgensen@gmail.com |
| Darcy Peterka | Columbia University | dp2403@columbia.edu |
| Hari Shroff | NIH | hari.shroff@nih.gov |
| Shigeki Watanabe | Johns Hopkins University | shigeki.watanabe@jhmi.edu |
| Yi Zuo | UC Santa Cruz | yizuo@ucsc.edu |
| Tom Reese (<i>Emeritus</i>) | NIH | treese@mbi.edu |

Teaching Assistants:

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| Dan Barson | Team Higley | daniel.barson@yale.edu |
| Lauren Panzera | Team Hoppa | lauren.c.panzera.gr@dartmouth.edu |
| Thien Vu | Team Jorgensen | thienvu91@gmail.com |
| Grant Kusick | Team Watanabe | gkusick1@jhmi.edu |
| Shaorong Ma | Team Zuo | mashaorong@ucsc.edu |
| Xiao Liu | Team Hammarlund | xiao.liu@yale.edu |
| Alison Kochersberger | Team Hammarlund | alison.kochersberger@yale.edu |
| Ines Vaz | Team Peterka | ioc2104@columbia.edu |

Special Lecturers:

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| Jeff Lichtman | Harvard University | jeff@mcb.harvard.edu |
| Stephen Smith | Allen Institute | stephens@alleninstitute.org |

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| July 1 – Mon | 9:00-9:10 | Section Introduction: Darcy Peterka |
| | 9:00-11:00 | Lecture: Jeff Lichtman <i>An Introduction to Light & An Introduction to Light Microscopy</i> |
| | 11:30-2:00 | Lunch/Free Time |
| | 2:00-6:00 | Rotations and Project Discussion |
| | 6:00-8:00 | Dinner/Free Time |
| | 8:00-9:00 | Monday Night Lecture: Rosalind Segal <i>Lecture Title: TBD</i> |
| July 2 – Tues | 9:00-11:00 | Lecture: Jeff Lichtman <i>Resolution in Light Microscopy and Principles of Fluorescence and its Implementation in Microscopy</i> |
| | 11:00-12:00 | Projects Day 1 |
| | 12:00-2:00 | Lunch/Free Time |

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| | 2:00-6:00 | Projects Day 1 |
| | 6:00-8:00 | Dinner/Free Time |
| | 8:00-12:00 | Projects Day 1 |
| July 3 – Wed | 9:00-11:00 | Lecture: Darcy Peterka <i>Scanning Fluorescence Microscopy for Functional Imaging</i> |
| | 11:00-12:00 | Projects Day 2 |
| | 12:00-2:00 | Lunch/Free Time |
| | 2:00-6:00 | Projects Day 2 |
| | 6:00-8:00 | Dinner/Free Time |
| | 8:00-12:00 | Projects Day 2 |
| July 4 – Thur | 9:00-12:30 | Parade Prep and Parade |
| | 12:30-1:30 | Lunch/Free Time |
| | 1:30-3:30 | Lecture: Hari Shoff <i>Extended Resolution – SIM and Light Sheet</i> |
| | 3:30-6:00 | Projects |
| | 6:00-8:00 | Dinner/Free Time |
| | 8:00-9:30 | Fireworks |
| July 5 – Fri | 9:00-11:00 | Lecture: Erik Jorgenson <i>Electron Microscopy</i> |
| | 11:00-12:00 | Projects Day 3 |
| | 12:00-2:00 | Lunch/Free Time |
| | 2:00-6:00 | Projects Day 3 |
| | 6:00-8:00 | Dinner/Free Time |
| | 8:00-12:00 | Projects Day 3 |
| July 6 – Sat | 9:00-11:00 | Lecture: Shigeki Watanabe <i>Postsynaptic Organization and Plasticity</i> |
| | 11:00-12:00 | Projects Day 4 |
| | 12:00-2:00 | Lunch/Free Time |
| | 2:00-6:00 | Projects Day 4 |
| | 6:00-8:00 | Dinner/Free Time |
| | 8:00-12:00 | Projects Day 4 |
| July 7 – Sun | DAY OFF | |
| July 8 – Mon | 9:00-11:00 | Lecture: Mike Higley <i>Using Optical Tools to Dissect Cortical Circuits</i> |
| | 11:00-12:00 | Projects Day 5 |
| | 12:00-2:00 | Lunch/Free Time |
| | 2:00-6:00 | Projects Day 5 |
| | 6:00-8:00 | Dinner/Free Time |
| | 8:00-9:00 | Reese Lecture: Clay Reid <i>Lecture Title: TBD</i> |
| | 9:00-12:00 | Projects Day 5 |

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| July 9 – Tues | 9:00-11:00 | Lecture: Stephen Smith <i>Neuropeptide Control of Cortical Circuits</i> |
| | 11:00-12:00 | Projects Day 6 |
| | 12:00-2:00 | Lunch/Free Time |
| | 2:00-6:00 | Projects Day 6 |
| | 6:00-8:00 | Dinner/Free Time |
| | 8:00-12:00 | Projects Day 6 |
| July 10 – Wed | 9:00-11:00 | Lecture: Marc Hammarlund <i>Subcellular Organization of Neurons</i> |
| | 11:00-12:00 | Projects Day 7 |
| | 12:00-2:00 | Lunch/Free Time |
| | 2:00-6:00 | Projects Day 7 |
| | 6:00-8:00 | Dinner/Free Time |
| | 8:00-10:00 | NS&B Lecture: Jess Cardin <i>Functional Flexibility: Development and Dynamics in State-Dependent Cortical Circuits</i> |
| July 11 – Thur | 9:00-11:00 | Lecture: Mike Hoppa <i>Excitability and Action Potentials</i> |
| | 11:00-12:00 | Projects Day 8 |
| | 12:00-2:00 | Lunch/Free Time |
| | 2:00-6:00 | Projects Day 8 |
| | 6:00-8:00 | Dinner/Free Time |
| | 8:00-12:00 | Projects Day 6 |
| July 12 – Fri | 9:00-11:00 | Lecture: Yi Zuo <i>Plasticity in Vivo</i> |
| | 11:00-12:00 | Analysis and Presentation Prep |
| | 12:00-2:00 | Lunch/Free Time |
| | 2:00-6:00 | Analysis and Presentation Prep |
| | 6:00-8:00 | Dinner/Free Time |
| | 8:00-12:00 | Analysis and Presentation Prep |
| July 13 – Sat | 9:00-11:30 | Project Presentation Prep |
| | 11:30-1:00 | Lunch/Free Time |
| | 1:00-3:00 | Project Presentations |
| | 3:00-6:00 | Free Time |
| | 6:00 | Cycle Change Party |
| | | TBD |
| July 14 – Sun | DAY OFF | |

Functional Genomics (7/15 - 8/2)

Section head: Jay Parrish, University of Washington

Section Description: The objective of the Functional Genomics section in the Neurobiology course is twofold. First, to train students to use cutting-edge methodology in unbiased genomics approaches to yield novel insights into neuronal diversity, function and disease. Second, to train students to design and perform targeted experiments that follow up on the massive data sets that often result from such unbiased approaches. We hope that this section will both educate the students in modern methodologies of RNAseq and data analysis as well as empower students to pursue these types of experiments in their own research programs.

Faculty:

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|--------------------|--------------------------|------------------------|
| Carrie Adler | Cornell University | adler.carrie@gmail.com |
| Diana Bautista | UC-Berkeley | dbautista@berkeley.edu |
| Gunther Hollopeter | Cornell University | guntherh@gmail.com |
| Jay Parrish | University of Washington | jzp2@uw.edu |
| Jeff Rasmussen | University of Washington | rasmuss@uw.edu |
| Alvaro Sagasti | UCLA | sagasti@mclb.ucla.edu |
| Thomas Sandmann | Denali Therapeutics | sandmann.t@gmail.com |

Teaching Assistants:

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| Divya Shiroor | Team Adler | shiroordivya@gmail.com |
| Sonali Mali | Team Bautista | smali@berkeley.edu |
| Takeshi Morita | Team Bautista | tksh.morita@gmail.com |
| Ed Partlow | Team Hollopeter | eddieapiii@gmail.com |
| Claire Williams | Team Parrish | clairew@uw.edu |
| Jiro Yoshino | Team Parrish | yoshino@bs.s.u-tokyo.ac.jp |
| Jeff Rosa | Team Sagasti | jeffro1@g.ucla.edu |

Special Lecturers:

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| Melissa Rolls | Penn State University | mur22@psu.edu |
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| July 15 – Mon | 9:00-11:00 | Section Overview: Jay Parrish |
| | 11:00-12:00 | Intro to Fly/Fish/ Mouse Dissections |
| | 12:00-2:00 | Lunch/Free Time |
| | 2:00-6:00 | Dissections/Sample Collection for RNAseq |
| | 6:00-8:00 | Dinner/Free time |
| | 8:00-10:00 | Lecture: Jay Parrish <i>Diversity and Development of Sensory Neurons</i> |
| | July 16 – Tues | 9:00-11:00 |
| 11:00-12:00 | | Sample Collection for RNAseq |
| 12:00-1:00 | | Lunch/Free Time |
| 1:00-6:00 | | Sample Collection for RNAseq |
| 6:00-7:00 | | Dinner/Free time |
| 7:00-9:00 | | Molecular Biology Breakout – Library Prep Overview |

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| | 9:00-10:00 | Sample Logging |
| July 17 – Wed | 9:00-11:00 | Lecture: Thomas Sandmann <i>RNA-Seq Analysis</i> |
| | 11:00-12:30 | AWS Login |
| | 12:30-1:30 | Lunch and free time |
| | 1:30-3:00 | Linux Tutorial |
| | 3:30-6:00 | QC Intro and Application |
| | 6:00-8:00 | Dinner/Free time |
| July 18 – Thur | 9:00-11:00 | Lecture: Jeff Rasmussen <i>CRISPR: Nerve Injury and Repair</i> |
| | 11:30-1:00 | Lunch/Free Time |
| | 1:00-4:30 | Mapping and Expression Modeling |
| | 5:00-6:00 | Breakout – Topic TBA |
| | 6:00-8:00 | Dinner/Free Time |
| July 19 – Fri | 9:00-12:00 | R Intro and Diff. Expression analysis of Existing Dataset |
| | 12:00-1:00 | Lunch/Free Time |
| | 1:00-2:00 | Statistics Primer (Rigor/Reproducibility) |
| | 2:00-6:00 | Preliminary Analysis of New Dataset |
| | 6:00-8:00 | Dinner/Free Time |
| | 8:00-10:00 | Forbes Lecture 1: Gilles Laurent <i>Cephalopods, Visual Perception, Motor Control and Brain Evolution</i> |
| July 20 – Sat | 9:00-10:00 | Data Visualization |
| | 10:00-12:30 | Data Analysis |
| | 12:30-2:00 | Lunch/Free Time |
| | 2:00-6:00 | Analysis of New Dataset |
| | 6:00-7:00 | Dinner/Free time |
| | 7:00-9:00 | Analysis of New Dataset/Presentation Preparation |
| | 9:00-10:00 | Breakout – Topic TBA |
| July 21 – Sun | DAY OFF | |
| July 22 – Mon | 9:00-12:00 | Student Presentations: RNA-Seq data analysis |
| | 12:00-1:30 | Lunch/Free Time |
| | 1:30-6:00 | Sub-group projects: Adler, Bautista, Hollopeter, Parrish, Sagasti |
| | 6:00-8:00 | Dinner/Free Time |
| | 8:00-10:00 | Forbes Lecture 2: Gilles Laurent <i>Lecture Title: TBD</i> |
| July 23 – Tues | 9:00-11:00 | Lecture: Alvaro Sagasti <i>Neuronal Cytoskeleton</i> |
| | 11:30-1:00 | Lunch/Free Time |
| | 1:00-2:00 | Data Visualization |
| | 2:00-6:00 | Data Analysis |

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| | 6:00-7:00 | Dinner/Free Time |
| | 7:00-12:00 | Data Analysis/Presentation Prep |
| July 24 – Wed | 9:00-11:00 | Lecture: Carrie Adler <i>Stem Cells and Neural Regeneration</i> |
| | 11:00-12:00 | Functional Analysis |
| | 12:00-2:00 | Lunch/Free Time |
| | 2:00-6:00 | Functional Analysis |
| | 6:00-8:00 | Dinner/Free Time |
| | 8:00-12:00 | Functional Analysis |
| July 25 – Thur | 9:00-11:00 | Lecture: Gunther Hollopeter <i>Forward Genetic Dissection of Endocytosis</i> |
| | 11:00-12:00 | Functional Analysis |
| | 12:00-2:00 | Lunch/Free Time |
| | 2:00-6:00 | Functional Analysis |
| | 6:00-8:00 | Dinner/Free Time |
| | 8:00-12:00 | Functional Analysis |
| July 26 – Fri | 9:00-11:00 | Lecture: Diana Bautista <i>Harnessing Genetic Variation in Mice to Identify Disease</i> |
| | 11:00-12:00 | Functional Analysis |
| | 12:00-2:00 | Lunch/Free Time |
| | 2:00-6:00 | Functional Analysis |
| | 6:00-8:00 | Dinner/Free Time |
| | 8:00-12:00 | Functional Analysis |
| July 27 – Sat | DAY OFF | |
| July 28 – Sun | DAY OFF | |
| July 29 – Mon | 9:00-11:30 | Functional Analysis |
| | 11:30-2:00 | Lunch/Free Time |
| | 2:00-6:00 | Functional Analysis |
| | 6:00-8:00 | Dinner/Free Time |
| | 8:00-10:00 | Monday Night Lecture: Melissa Rolls <i>Cell Biology of Regeneration</i> |
| July 30 – Tues | 9:00-11:30 | Functional Analysis |
| | 11:30-2:00 | Lunch/Free Time |
| | 2:00-6:00 | Functional Analysis |
| | 6:00-8:00 | Dinner/Free Time |
| | 8:00-12:00 | Functional Analysis |
| July 31 – Wed | 9:00-11:30 | Functional Analysis |
| | 11:30-2:00 | Lunch/Free Time |
| | 2:00-6:00 | Functional Analysis |
| | 6:00-8:00 | Dinner/Free Time |

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| | 8:00-12:00 | Functional Analysis |
| Aug 1 – Thur | 9:00-11:30 | Functional Analysis |
| | 11:30-2:00 | Lunch/Free Time |
| | 2:00-6:00 | Functional Analysis |
| | 6:00-8:00 | Dinner/Free Time |
| | 8:00-12:00 | Functional Analysis/Presentation Prep |
| Aug 2 – Fri | 9:00-11:30 | Presentation Prep |
| | 11:30-1:00 | Lunch/Free Time |
| | 1:00-3:00 | Project Presentations |
| | 6:30 | Graduation Party |
| | | Lobster Dinner – Location TBD |
| Aug 3 – Sat | | Check out and depart |