



# The Short Course on the Application of Machine Learning for Automated Quantification of Behavior

Bar Harbor, Maine  
October 8 - 12, 2023

## Schedule of Activities

### Sunday, October 8<sup>th</sup>

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|----------------|---|
| 3:00 - 8:00 pm | <b>Registration</b><br><i>Participants are not permitted to enter Highseas prior to 3:00pm.</i> |
| 6:00 – 7:00 pm | <i>Dinner</i>   |
| 7:00 – 8:30 pm | <b>Poster Session</b>   |

### Monday, October 9<sup>th</sup>

#### ***Fundamentals of Computer Vision and Machine Learning***

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| 7:00 – 7:45 am   | <i>Breakfast</i>   |
| 7:45 – 8:00 am   | <b>Welcome &amp; Announcements</b><br>Vivek Kumar, Ph.D., The Jackson Laboratory   |
| 8:00 - 9:00 am   | <b>Introductions/What is Behavior?</b><br>Gordon Berman, Ph.D., Emory University   |
| 9:00 - 10:00 am  | <b>Keynote –Talk Title TBD</b><br>Kristin Branson, Ph.D., Howard Hughes Medical Institute  |
| 10:00 - 10:15 am | <i>Break</i>   |
| 10:15 - 11:15 am | <b>Machine learning tools for analyzing pose, identity and behavior</b><br>Alexander Mathis, Ph.D., École Polytechnique Fédérale de Lausanne |
| 11:15 - 12:15 pm | <b>Quantifying behavior using deep learning</b><br>Talmo Pereira, Ph.D., The Salk Institute for Biological Studies                           |
| 12:15 - 1:00 pm  | <i>Lunch</i>   |
| 1:00 – 3:00 pm   | <b>Break for activities led by Instructors</b>   |
| 3:00 - 6:00 pm   | <b>Workshop: Introductory Python</b><br>Susan McClatchy, M.S., The Jackson Laboratory<br><i>(Highseas Classroom, 3<sup>rd</sup> Floor)</i>   |

**Workshop: Software Engineering for Researchers Bootcamp**

David Rumph, California Institute of Technology  
(Highseas, First Floor)

6:00 - 7:00 pm

*Dinner*

7:00 - 8:30 pm

**Evening Discussion - Brain Behavior Quantification and Synchronization  
Program Officers**  
(Highseas Classroom, 3<sup>rd</sup> Floor)

**Tuesday, October 10<sup>th</sup>**

***Fundamentals of Behavior Quantification***

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7:00 – 7:45 am

*Breakfast*

7:45 – 8:00 am

**Announcements**

Gordon Berman, Ph.D., Emory University

8:00 - 9:00 am

**3D joint tracking with Anipose to dissect neural mechanisms of  
sensorimotor control**

John Tuthill, Ph.D., University of Washington

9:00 - 10:00 am

**Measuring the structure of animal behavior**

Gordon Berman, Ph.D., Emory University

10:00 - 10:15 am

*Break*

10:15 - 11:15 am

**Exploring Behavior through Dynamical Systems**

Greg Stephens, Ph.D., Vrije Universiteit Amsterdam

11:15 - 12:15 pm

**Modeling multi-subject and naturalistic behavior**

Shreya Saxena, Ph.D., Yale University

12:15 - 1:00 pm

*Group Photo*

*Lunch*

1:00 - 3:00 pm

**Break for Activities led by Instructors**

3:00 – 4:30 pm

**Workshop: SLEAP**

Talmo Pereira, Ph.D., The Salk Institute for Biological Studies

4:30 – 6:00 pm

**Workshop: DLC**

Alexander Mathis, Ph.D., École Polytechnique Fédérale de Lausanne

6:00 - 7:00 pm

*Lobster Dinner*

7:00 - 8:30 pm

**Evening Discussion**

## Wednesday, October 11th

### *Applied Behavior Quantification*

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7:00 – 7:45 am	<i>Breakfast</i>
7:45 – 8:00 am	<b>Announcements</b> Ann Kennedy Ph.D., Northwestern University
8:00 - 9:00 am	<b>Simulated connectomes as digital sandbox to understand behavior</b> Benjamin de Bivort, Ph.D., Harvard University
9:00 - 10:00 am	<b>Machine learning as a lens for action selection</b> Jeff Markowitz, Ph.D., Georgia Tech and Emory University
10:00 - 10:15 am	<i>Break</i>
10:15 - 11:15 am	<b>Talk Title TBD</b> Vivek Kumar, Ph.D., The Jackson Laboratory
11:15 - 12:15 pm	<b>A paradigm shift in translational psychiatry through rodent neuroethology</b> Yair Shemesh, Ph.D., Weizmann Institute of Science
12:15 - 1:00 pm	<i>Lunch</i>
1:00 – 3:00 pm	<b>Break- Activities led by Instructors</b>
3:00 – 4:30pm	<b>Workshop: Keypoint MoSeq</b> Sherry Lin, M.S., Harvard University Caleb Weinreb, Ph.D., Harvard University
4:30 – 6:00 pm	<b>Workshop: Motion Mapper</b> Gordon Berman, Ph.D., Emory University TA: Michael Hess, Emory University
6:00 - 7:00 pm	<i>Dinner</i>
7:00 - 8:30 pm	<b>Evening Discussion</b>

## Thursday, October 12<sup>th</sup>

### *Technology Development*

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7:00 – 7:45 am	<i>Breakfast</i>
7:45 – 8:00 am	<b>Announcements</b>
8:00 - 9:00 am	<b>Establishing a quantitative framework for mouse locomotor coordination</b> Megan Carey, Ph.D., Champalimaud Centre for the Unknown

9:00 - 10:00 am	<b>Supervised learning for behavioral quantification</b> Ann Kennedy, Ph.D., Northwestern University
10:00 - 10:15 am	<i>Break</i>
10:15 - 11:15 am	<b>New ideas in quantifying social behavior</b> Joshua Shaevitz, Ph.D., Princeton University
11:15 - 12:15 pm	<b>AI for Scientists: Perception &amp; Discovery</b> Jennifer Sun, Ph.D., California Institute of Technology
12:15 – 1:15pm	<i>Lunch – Boxed lunches will be available</i> <i>Shuttles &amp; Carpool to Town Pier. Free parking at Bar Harbor Club.</i>
1:15 – 3:15 pm	<i>Bay Cruise</i>
3:15 – 3:30 pm	<i>Shuttles &amp; Carpool to Highseas</i>
3:30 – 5:00 pm	<b>Workshop: Supervised Behavior</b> Vivek Kumar, Ph.D., The Jackson Laboratory Ann Kennedy Ph.D., Northwestern University TAs: Jacob Beierle, Ph.D., The Jackson Laboratory and Jaycee Choi, The Jackson Laboratory Andrew Ulmer, Northwestern University
5:00 – 6:30 pm	<b>Workshop: Advanced Modeling</b> Benjamin de Bivort, Ph.D., Harvard University TA: Danylo Lavrentovich, Harvard University
6:30 – 7:30 pm	<i>Dinner</i>
7:30 - 8:30 pm	<b>Evening Discussion</b>

## Friday, October 13<sup>th</sup>

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7:00 - 9:00 am	<i>Grab-n-Go Breakfast &amp; Departures</i> <i>Participants may remain on the 1<sup>st</sup> floor until 12:00pm if needed.</i>
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