FUN Summer Virtual Meeting
Teaching, Learning, and Mentoring Across Distances

July 30th – August 1st, 2020
# Table of Contents

**Welcome**  
5

**Schedule Overview**  
6

**Presentation formats and responsible behavior**  
8

**Contacts**  
9

**Social Media**  
9

**FUN statement on diversity, equity and inclusion**  
10

**Sponsors**  
11

**Thanks and Acknowledgements**  
12

**SCHEDULE AND FULL ABSTRACTS**  
13

## Thursday, July 30th  

*12:00 PM EDT – Satellite event*  

Core Concepts Workshop  

*3:00 PM EDT – Introductions*  

Alo Basu and Jason Chan, co-chairs of FUN SVM  

Julio Ramirez and Eric Wiertelak, FUN workshop  

*3:30 PM EDT – Online Labs 1*  

William (Bill) Grisham, Frank Krasne, Natalie Schottler, Ryan Grgurich, & Andrew Howe  

Jim Ryan, Bruce Johnson and David Deitcher  

Stefan Pulver, Jonathan Booth, Varun Sane, Malte Gather  

Will Wharton and Greg Gage  

Maria del Mar Quiroga and Nic Price  

*8:00 PM EDT – Posters, Neuroscience Working Sessions, and Sponsor Booths*  

Neuroscience subdiscipline working sessions  

Susan Banks  

Shlomit Faiher-Grinberg  

William (Bill) Grisham, Hannah Whang Sayson, Natalie Schottler, and Marc Levis-Fitzgerald  

Alexis Hill  

Marta M. Iversen, Mark R. Brinton, Tyler S. Davis, Jacob A. George  

Roshan Jain, Jamie Becker, Matthew Carrigan, Yongjie Gao, Alexis Giron, and Carlotta Pazzi  

William Ju and Maksym Shcherbina  

Yuan Yuan (Connie) Kang, Malcolm Guzman, Jose Gonzalez, Weining Feng  

Angel Kaur
Friday, July 31st

11:30AM EDT – Keynote presentation
Dr. Mays Imad

1:00 PM EDT –Moderated Discussion of DEI topics

2:00 PM EDT – Remote teaching tools 1
Pradeep George, Malin Sandström, Heather Topple, Mathew Birdsall Abrams
William Heitler
Melanie P. Leussis, S. Lakshmi Haferman, Robert B. McCormack, and Madison Garnick
Tamily Weissman

3:30PM EDT – Online labs 2
Brandon Calderon, ADInstruments
Mary Morrison
Denise R. Cook-Snyder and Daniel G. Ehlinger
Declan Ali
Eli Meir

5:30 PM EDT – Diversity, Equity and Inclusion in Neuroscience 1
Ronald Bayline
Lauren Stutts
Jessica Good

6:30 PM EDT – Funding opportunities
Ellen Carpenter, NSF
Marguerite Matthews, NIH/NINDS

8:00 PM EDT – Themed socials

Saturday, August 1st

11:00 AM EDT – Remote teaching tools 2
Paula Miles
Ashley Juavinett
Deanne Buffalari

12:30 PM EDT – Diversity, Equity and Inclusion in Neuroscience 2
Monica Linden, Jane Kruskop and Eva Kitlen
Ian Harrington
Alo Basu

1:30 PM EDT – Online labs 3
  Kaitlyn Casimo
  Marc Nahmani
  Robert Wyttenbach
  Sally Seraphin and Shannon Stock

3:30 PM EDT – Core concepts and competencies
  Jean Hardwick
  Jennifer Schaefer, Audrey Chen Lew, Kimberley Phillips, Patrick Sonner

4:30 PM EDT – FUN Presidential Plenary

5:30 PM EDT – Closing
Welcome

On behalf of the Faculty for Undergraduate Neuroscience (FUN), welcome to the first Summer Virtual Meeting (SVM). We titled this meeting “Teaching, Learning, and Mentoring Across Distances,” to capture a set of needs and bring together the neuroscience education community. Student, faculty, and staff lives were shaken by the COVID-19 pandemic, police brutality and racial injustices, and prominent exposure of gaps in equity. We hope the SVM allows new, experienced, and aspiring faculty to share teaching resources and to reflect on how we can improve and diversify neuroscience education. We are disappointed that we could not convene in-person at Davidson College, the site of the inaugural FUN workshop in 1995, to learn about advances in neuroscience education and foster relationships. However, building upon the spirit of the FUN workshops and the drive to innovate and make connections, the SVM brings you: neuroscience online labs, remote teaching resources, and discussions on diversity, equity, and inclusion in higher education.

The upcoming academic year may bring unique challenges. According to the Chronicle of Higher Education, 43% of colleges and universities are planning for online or hybrid models of teaching – and this number is changing rapidly. You might be developing online material for the first time. Perhaps you are thinking about whether you can still engage students with the same evidence-based, active learning practices that have transformed college classrooms in recent decades. A TopHat survey of students this Spring showed that 78% of respondents said the “lack of an engaging in-class presence” contributed to their difficulties adjusting to online learning. Can we fully understand the concerns of students? How will we adjust?

While these questions do not have easy solutions, we developed three SVM themes to consider these issues.

- **Diversity, equity and inclusion (DEI):** Highlighted by our Keynote speaker Dr. Mays Imad and ensuing moderated discussions, DEI sessions will focus on student mindset, creating inclusive and equitable environments, and diversity within neuroscience.
- **What works in remote teaching:** Presenters will discuss some activities that have engaged students and enhanced learning in the neuroscience virtual classroom.
- **Online labs:** Presentations will cover a broad array of available resources across methods and subdisciplines, and emphasize how they can be adapted to online formats.

Evening events will give you an opportunity to network with new and familiar colleagues, and to discuss “what works” in more detail.

- **Poster session:** Learn about what new projects our neuroscience colleagues have been doing in their courses and programs.
- **Neuroscience working groups:** Join a “hack-a-thon” to develop resources for online labs exercises for specific neuroscience subdisciplines/courses.
- **Socials:** Meet colleagues in an informal discussion on specific themes.

We hope this Summer Virtual Meeting provides ideas to enhance whatever teaching mode you will follow this year and helps prepare us for the challenges ahead as a creative, collaborative, and supportive community. Furthermore, we hope the collective neuroscience community can reflect on how we can be more effective, equitable, and empathetic educators.
## Schedule Overview

<table>
<thead>
<tr>
<th>Theme 1: Diversity, Equity and Inclusion</th>
<th>Theme 3: Online lab resources</th>
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</thead>
<tbody>
<tr>
<td>Theme 2: What works in remote teaching</td>
<td>Theme 4: Socials/Posters</td>
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### Thursday, July 30th

<table>
<thead>
<tr>
<th>PDT</th>
<th>EDT</th>
<th>Session Type</th>
<th>Topic</th>
<th>Duration</th>
<th>Presenter(s)</th>
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<tbody>
<tr>
<td>9:00 AM</td>
<td>12:00 PM</td>
<td>Satellite</td>
<td>Core concepts workshop</td>
<td>3hr</td>
<td>Audrey Chen Lew, Kimberley Phillips, Jennifer Schaefer, Patrick Sonner</td>
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<tr>
<td>12:00 PM</td>
<td>3:00 PM</td>
<td>Introduction</td>
<td>Introduction</td>
<td>15min</td>
<td>Alo Basu and Jason Chan</td>
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<tr>
<td>12:15 PM</td>
<td>3:15 PM</td>
<td>Introduction</td>
<td>FUN workshop</td>
<td>15min</td>
<td>Julio Ramirez and Eric Wiertelak</td>
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<tr>
<td>12:30 PM</td>
<td>3:30 PM</td>
<td>Theme 3: Online labs</td>
<td>1. Digital labs for the Far-flung</td>
<td>30min</td>
<td>Bill Grisham</td>
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<tr>
<td></td>
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<td></td>
<td>2. Build your own neuroscience equipment</td>
<td>30min</td>
<td>Jim Ryan</td>
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<td>3. Teaching principles of motor systems</td>
<td>30min</td>
<td>Stefan Pulver</td>
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<td>4. Low cost SpikerBoxes</td>
<td>30min</td>
<td>Will Wharton and Greg Gage</td>
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<td>5. Virtual experiments to support neuroscience teaching</td>
<td>10min</td>
<td>Maria del Mar Quiroga and Nic Price</td>
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</tbody>
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5:00 PM | 8:00 PM | Posters, Neuroscience working sessions, and Sponsor booths (hosted on Padlet)

### Friday, July 31st

<table>
<thead>
<tr>
<th>PDT</th>
<th>EDT</th>
<th>Session Type</th>
<th>Topic</th>
<th>Duration</th>
<th>Presenter(s)</th>
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<tbody>
<tr>
<td>8:30 AM</td>
<td>11:30 AM</td>
<td>Keynote</td>
<td>Introduction of Dr. Mays Imad</td>
<td>1hr</td>
<td>Mays Imad</td>
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<td></td>
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<td></td>
<td>Trauma-informed Pedagogy</td>
<td>1hr</td>
<td>Various</td>
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<tr>
<td>10:00 AM</td>
<td>1:00 PM</td>
<td>Discussion</td>
<td>Moderated discussion of DEI topics</td>
<td>1hr</td>
<td>Various</td>
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<tr>
<td>11:00 AM</td>
<td>2:00 PM</td>
<td>Theme 2: Remote teaching tools</td>
<td>1. TrainingSpace: NeuroEducation without Borders</td>
<td>20min</td>
<td>Mathew Abrams</td>
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<td>2. Neurosim</td>
<td>20min</td>
<td>William Heitler</td>
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<td>3. Open Education Resources</td>
<td>20min</td>
<td>Melanie Leussis</td>
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<td>4. Making Grant Review Real for Students</td>
<td>10min</td>
<td>Tamily Weissman</td>
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<tr>
<td>12:30 PM</td>
<td>3:30 PM</td>
<td>Theme 3: Online labs</td>
<td>1. Lt Neuroscience Labs in the COVID Era</td>
<td>30min</td>
<td>Brandon Calderon</td>
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<td></td>
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<td>2. ICC and Western Blot</td>
<td>20min</td>
<td>Mary Morrison</td>
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<td>3. Writing and Adapting Case Studies</td>
<td>30min</td>
<td>Denise Cook Snyder and Daniel Ehlinger</td>
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<td>4. Neuromembrane</td>
<td>10min</td>
<td>Declan Ali</td>
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<td></td>
<td>5. Action potentials</td>
<td>10min</td>
<td>Eli Meir</td>
</tr>
<tr>
<td>Time</td>
<td>Session Type</td>
<td>Theme</td>
<td>Topic</td>
<td>Duration</td>
<td>Presenter(s)</td>
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<tr>
<td>2:30 PM</td>
<td>5:30 PM</td>
<td>Theme 1: DEI</td>
<td>1. Open Book/Open Note Exams</td>
<td>10min</td>
<td>Ron Bayline</td>
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<td></td>
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<td>2. Building Resilience</td>
<td>20min</td>
<td>Lauren Stutts</td>
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<td>3. Diversity in the STEM Classroom</td>
<td>20min</td>
<td>Jessica Good</td>
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<tr>
<td>3:30 PM</td>
<td>6:30 PM</td>
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<td>NSF</td>
<td>30min</td>
<td>Ellen Carpenter</td>
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<td>NIH</td>
<td>30min</td>
<td>Marguerite Matthews</td>
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<tr>
<td>5:00 PM</td>
<td>8:00 PM</td>
<td></td>
<td>Socials</td>
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</tbody>
</table>

**Saturday, August 1st**

<table>
<thead>
<tr>
<th>PDT</th>
<th>EDT</th>
<th>Session Type</th>
<th>Topic</th>
<th>Duration</th>
<th>Presenter(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 AM</td>
<td>11:00 AM</td>
<td>Theme 2: Remote teaching tools</td>
<td>1. Investigating Staff and Student Understanding of Good Academic Practice</td>
<td>30min</td>
<td>Paula Miles</td>
</tr>
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<td></td>
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<td>2. Jupyter Notebooks for Teaching</td>
<td>30min</td>
<td>Ashley Juavinett</td>
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<td></td>
<td></td>
<td>3. Guided Worksheets for Student Engagement</td>
<td>10min</td>
<td>Deanne Buffalari</td>
</tr>
<tr>
<td>9:30 AM</td>
<td>12:30 PM</td>
<td>Theme 1: DEI</td>
<td>1. Highlighting Diversity in Neuroscience</td>
<td>10min</td>
<td>Monica Linden</td>
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<tr>
<td></td>
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<td>2. Survey of introductory neuroscience courses</td>
<td>10min</td>
<td>Alo Basu</td>
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<td>3. Celebrating and Sharing Diverse Voices in Neuroscience</td>
<td>10min</td>
<td>Ian Harrington</td>
</tr>
<tr>
<td>10:30 AM</td>
<td>1:30 PM</td>
<td>Theme 3: Online labs</td>
<td>1. Allen Brain Map</td>
<td>30min</td>
<td>Kaitlyn Casimo</td>
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<td>2. Fast, Free and 3D! Teaching</td>
<td>20min</td>
<td>Marc Nahamni</td>
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<td>3. Video Microscopy for Teaching</td>
<td>20min</td>
<td>Robert Wyttenbach</td>
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<td>4. Teaching with Real Human Data</td>
<td>20min</td>
<td>Sally Seraphin and Shannon Stock</td>
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<tr>
<td>12:30 PM</td>
<td>3:30 PM</td>
<td></td>
<td>Core Competencies; Core Concepts</td>
<td>60</td>
<td>Jean Hardwick; Audrey Chen Lew, Kimberley Phillips, Jennifer Schaefer, Patrick Sonner</td>
</tr>
<tr>
<td>1:30 PM</td>
<td>4:30 PM</td>
<td>FUN Presidential Plenary</td>
<td>FUN DEI commitments and action priorities</td>
<td>60</td>
<td>Mary Morrison, Kurt Illig, and Ronald Bayline</td>
</tr>
<tr>
<td>2:30 PM</td>
<td>5:30 PM</td>
<td></td>
<td>Closing</td>
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</table>
Presentation formats and responsible behavior

Presentations
- All presentations will be hosted through Zoom.
- Please mute your audio during all presentations.
- Presentations with permission for recording will be available for on demand viewing for FUN members only through the FUN website behind the member login.

Privacy and recordings
- All meeting attendees will be asked to refrain from unauthorized photography or recording throughout the FUN 2020 SVM. However, please note that we do not have the ability to enforce this policy in an online environment. The viewer has the ability to take photographs, screen shots, or audio/video recordings.
- Conference sessions will be facilitated by moderators and monitored by FUN Planning Committee Members. Any attendee exhibiting disruptive behavior will be removed from the session.

Questions
- If you have a question during the presentation, please enter it in the CHAT room. The moderator will call on you to ask your question. Unanswered questions from the chat will be forwarded to the presenter.

In case of a malicious disruption of a session ("Zoom-bombing"), leave the meeting and check your e-mail. A new zoom link will be sent promptly and the session will resume immediately at the new link.
Contacts

If you need help, please contact a member of the SVM planning committee:

Alo Basu
abasu@holycross.edu

Jason Chan
jchan@marian.edu

Yuan Yuan (Connie) Kang
kangy@uhd.edu

Melanie Leussis
leussism@emmanuel.edu

Social Media

@FUNfaculty

Use #FUNSVM during the meeting

Faculty for Undergraduate Neuroscience
@faculty.for.undergraduate.neuroscience
FUN statement on diversity, equity and inclusion

We join our voices with countless others across the country in an unequivocal condemnation of police brutality, institutionalized racism, and all forms of anti-black violence. As a scientific community, we acknowledge that our own past is filled with examples where we have brought violence against Black, Indigenous, and People of Color (BIPOC), from histories as overt as the Tuskegee Syphilis trials or the unethical use of Puerto Rican women as subjects in birth control trials to the more pernicious acts of everyday racism that occur in our colleges and universities. Unfortunately, we are still not far from this history. This past week, George Floyd was killed in Minneapolis, and as COVID-19 ravages the globe and affects all of us in deeply painful ways, our BIPOC communities have disproportionately carried the burden.

However, insofar as we have been complicit in racism, we also hold the tools for a robust participation in the work of anti-racism. What we do with students in our classrooms and in our labs is not separate from the work of racial justice. We all have our part to play. Indeed, we as scientists must marshal all our skills (yes, even pipetting!) toward creating a brighter future and more equitable world. As scholar-teachers, we must create neuroscience as an inclusive space for our students, especially for our students of color. FUN commits to taking concrete steps to further educate, equip, and heal our community.

We make 4 commitments to action that will be implemented in our organizational structure and future programming:

1) **Reflection toward action**: We commit to intentional reflection on the ways in which we participate in systems of oppression. We believe that only through critical reflection can we begin to identify and then dismantle these systems. We commit to making FUN programming, committee membership and leadership opportunities accessible and inclusive, and we commit to taking this step together as a unified community that recognizes the reality and pain of racial inequality.

2) **Science as healing**: We recognize the need to create a safe space for BIPOC neuroscientists to share stories, struggles, and strategies for healing. We commit to creating this space.

3) **Research as resistance**: We commit to highlighting neuroscience research, especially by undergraduate students, that inform the biological, biopsychology, and behavioral ramifications of chronic oppression.

4) **Pedagogy of the oppressed**: We commit to supporting faculty and programs in their anti-racism work, through workshops and sessions on inclusive excellence in STEM which recognize the full humanity and full potential of BIPOC students and perspectives. This means a focus on inclusion as well as diversity, and a rejection of deficit-informed methods.

These commitments are just the beginning and we will use our summer virtual meeting to take the first steps. As a diverse and vibrant community, FUN has a responsibility to our members to take action. As a leader in undergraduate neuroscience, we have a duty to the broader scientific community to advance the ideals of diversity, equity, inclusion, and justice.
Sponsors

We thank the following sponsors for the contributions that made the FUN Summer Virtual Meeting possible.

Your Individual Donations
THANK YOU!

Summer Virtual Meeting
July 30 - August 1, 2020

ADINSTRUMENTS

BACKYARD BRAINS
NEUROSCIENCE FOR EVERYONE!
Thanks and Acknowledgements

275+ of You (as of 7/28/20)!

Registrants by location

Faculty for Undergraduate Neuroscience Workshop Planning Committee!
Despite not having a workshop at Davidson, we thank this group for planning what would have been an amazing workshop, identifying many presenters for the SVM and providing ad hoc support throughout the planning process.

- Alo Basu, SVM co-chair, College of the Holy Cross
- Irina Calin-Jageman, Dominican University
- Robert Calin-Jageman, Dominican University
- Jason Chan, SVM co-chair, Marian University
- Bruce Johnson, Cornell University
- Barbara Lom, Davidson College
- Julio Ramirez, Davidson College
- Eric Wiertelak, Committee Chair, Macalester College

SVM planning committee
- Alo Basu, SVM co-chair, College of the Holy Cross
- Robert Calin-Jageman, Dominican University
- Jason Chan, SVM co-chair, Marian University
- Bruce Johnson, Cornell University
- Yuan Yuan (Connie) Kang, University of Houston, Downtown
- Melanie Leussis, Emmanuel College

A Special Thank You to FUN Treasurer Veronica Martinez-Acosta and JUNE Editor-in-Chief Raddy Ramos for making the many adjustments needed to support the SVM and meeting proceedings.
SCHEDULE AND FULL ABSTRACTS

Thursday, July 30th

12:00 PM EDT – Satellite event
This requires a separate registration
Core Concepts Workshop
Audrey Chen Lew, University of California, Irvine
Kimberley Phillips, Trinity University
Jennifer Schaefer, College of St. Benedict/St. John’s University
Patrick Sonner, Wright State University

Several scientific disciplines have identified undergraduate educational core concepts for their respective fields. These core concepts are tremendously useful in curriculum development and assessment. Neuroscience has yet to construct such a list. A group of FUN members conducted a nationwide survey to solicit suggestions for core concepts in undergraduate neuroscience education from neuroscience educators. The methodology and results of this survey, and a preliminary list of core concepts, will be presented for additional discussion and feedback in a satellite session.

This working session will provide neuroscience educators an opportunity to critically discuss the preliminary core concepts, including overlap in core concepts, revisions to core concepts, and missing core concepts. If interested in attending, please submit your contact information at the registration link below. The preliminary list of core concepts and a Zoom session link will be sent to registered participants one week prior to the working session. Registration for this workshop can be found here.

3:00 PM EDT – Introductions
Alo Basu and Jason Chan, co-chairs of FUN SVM
Overview of the Summer Virtual Meeting
Julio Ramirez and Eric Wiertelak, FUN workshop
FUN Workshop reflection

3:30 PM EDT – Online Labs 1
William (Bill) Grisham, Frank Krasne, Natalie Schottler, Ryan Grgurich, & Andrew Howe
University of California, Los Angeles

Digital Labs for the Far-flung: Resources for Online Learning
This presentation will describe digital resources available for distance learning on our MDCUNE website (https://mdcune.psych.ucla.edu/). These resources reflect several aspects of neuroscience: neurophysiology, neuroendocrinology, molecular neuroscience, neuropharmacology, and quantitative neuroanatomy including human MRI scans. These
pedagogical experiences are not canned or cookbook labs; they are genuine inquiry-based labs in which students access authentic materials to derive their data. These labs characteristically produce significant data and solid pedagogical experiences. All of these labs are designed to be plug-and-play and come with instructor aids (some come with lectures and slides). Many have been described in JUNE articles that provide background and evidence of pedagogical efficacy. Instructors can also request an account allowing access to answer keys and additional materials for teaching the unit. These labs can be utilized anywhere, are provided free of charge, and are ideal for distance learning. Support from NSF Grant DUE 0717306 and UCLA Office of Instructional Development.

Jim Ryan, Bruce Johnson and David Deitcher
JR: Hobart and William Smith Colleges
BJ and DD: Cornell University

Building your own neuroscience equipment: A precision micromanipulator and an epi-fluorescence microscope for calcium imaging

A faculty member’s ability to develop meaningful research-oriented laboratories in neurobiology is often hampered by the rapid pace of new technologies and the increasing cost of equipment. To help undergraduate neuroscience faculty meet these challenges, we developed this online workshop to help educators learn to build our own research and lab teaching equipment. First, we will describe a precision micromanipulator for neurophysiology applications costing less than $35. We then compare data generated using the DIY manipulator with commercial micromanipulators costing over $1000. In the second part of the workshop we will demonstrate our newly designed 3D printed epi-fluorescence microscope, called the EpiScope. Commercial fluorescence imaging devices often cost over $30,000, but our 3D printed version costs around $1200. The EpiScope uses interchangeable LED light sources and filter sets to image static fluorescence in prepared slides and calcium imaging of neuronal activity in living Drosophila brains. This later technique uses transgenic flies with a genetically encoded calcium indicator, GCaMP, linked to green fluorescent protein (GFP). During an action potential, calcium ions (Ca2+) enter neurons and are observed in vivo as an increase in fluorescence intensity from a series of video images. These neuronal firing patterns can be assessed quantitatively to understand neural circuits leading to specific behaviors.

Stefan Pulver, Jonathan Booth, Varun Sane, Malte Gather
JB, VS, MG, SP: University of St Andrews, St Andrews, UK
MG: University of Cologne, Cologne, Germany

Teaching principles of motor systems using behavioural analyses and live imaging of neural activity in Drosophila larvae

Central pattern generating (CPG) circuits produce fictive patterns of rhythmic motor activity in the absence of sensory feedback. CPG preparations in a variety of species have been effective at uncovering principles of motor control and neuromodulation. However, CPG preparations are often difficult to export to teaching laboratories due to lengthy dissection times and the necessity for electrophysiological training and equipment. Here we discuss how to study CPG activity in the teaching lab using behavioural analyses and live imaging of genetically encoded calcium indicators in Drosophila larvae. First we present
simple inexpensive methods for measuring rhythmic behaviours in 3\textsuperscript{rd} instar larvae. Next, we present how to convert compound microscopes into fluorescent imaging systems using commercially available filter sets, 3D printed materials, and high-powered bicycle lights. We show how to use this equipment to image CPG activity in the isolated larval central nervous system and discuss options for incorporation into teaching laboratories.

Will Wharton and Greg Gage
BackYard Brains

Planning for remote labs and remote lectures using portable, battery-operated, low-cost SpikerBoxes

Backyard Brains develops low-cost, open-source bioamps called “SpikerBoxes” that allow a tractable way to introduce neuroscience techniques to your teaching labs, either in a traditional classroom setting or remotely with online teaching. Our research has shown that students working remotely on labs on Harvard’s MOOC increase their confidence in doing science much more than passively watching experiment videos (DeBoer et al, 2017, EJEE). This workshop will demonstrate introductory experiments that focus on hearing and seeing neurons in a simple cockroach leg prep, and with non-invasive human electrophysiology: EEG, EKG, and EMGs. Finally, we will discuss some tips on (and be an example of) how to perform demos on a zoom call so that others can see the experimental prep, data, and lecture notes simultaneously.

Maria del Mar Quiroga and Nic Price
MMQ: The University of Melbourne
NP: Monash University

Virtual experiments to support neuroscience teaching

An important part of science education is to learn through direct experience of the scientific process, usually in the form of practical laboratory classes. However, sensory neuroscience experiments are often not suitable for classroom experimentation due to requiring expensive equipment and the use of animals. We developed an online simulation of a visual neuroscience experiment in which extracellular recordings are made from a motion sensitive neuron. The resource allows students to control experimental parameters and see and hear the action potential responses to stimuli as they are presented, and download individualised and realistic datasets incorporating biological variability for further offline analysis. We licensed the code CC-BY-NC 4.0, which enables educators to adapt our experiment to their needs and use it in their classroom.
Neuroscience subdiscipline working sessions

Join a “hack-a-thon” group to help brainstorm your lab, and how it might be delivered in a remote/hybrid/hyflex format. Come meet colleagues in your specific neuroscience field, share resources, discover new approaches to neuroscience education, and reflect on ways to be more inclusive. The following are working session topics and moderators.

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<th>Topic in Neuroscience</th>
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<tr>
<td>Behavioral</td>
<td>Jackie Rose</td>
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<td>Systems</td>
<td>Siobhan Robinson</td>
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<td>Computational</td>
<td>Kurt Illig</td>
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<td>Cellular/Molecular</td>
<td>Leah Chase</td>
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<td>Physiology</td>
<td>Ashley Juavinett</td>
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<td>Sleep and Rhythms</td>
<td>Mary Harrington</td>
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Susan Banks
Florida Southern College

Mind the Gap: Bridging Siloed Biology and Psychology Learning Communities through Supplementary Interactions

The incorporation of a learning community into the college curriculum has the goal of improving the student experience and retention through increased academic engagement, mentoring, and community building. Participating in a learning community was integrated into the college curriculum for all first-year students at Florida Southern College starting in the fall of 2018. The Psychology department had a well-established Linked Courses model involving two introductory psychology courses. The Biology department established a new multi-section learning community based on the Freshman Interest Group model. Although a central goal of learning communities is to foster interdisciplinary interaction, the logistics were daunting with the large number of students involved in each of these learning communities (approximately 180 students). Using extracurricular interactions with shared similar themes, we integrated both learning communities and shared the burden of event organization across both programs. Here, we describe details of the successful events including content, organization, and outcomes.

Shlomit Flaiher-Grinberg
Saint Francis University (PA)

The Neuroscience of Fun! Creating an Avenue of Public Education through Academia-Community Partnerships

The field of neuroscience offers exciting, yet complex, insights into the human mind. In recent years, the need to improve the dialogue between neuroscientists and the public has
been recognized, and an emphasis has been placed on the generation of public-based programs which reach outside the academic environment and into the community. The current project was designed to create partnerships between the Department of Psychology at Saint Francis University and multiple community allies in rural Pennsylvania, which will allow the generation of a public-oriented, neuroscience-based, fun, informative and educational outreach program. The community partners for the program included public libraries, children museums, scout troops and elementary schools. The analysis of feedback collected thus far suggests that the program attracts much interest, improves the communication of neuroscientific data to the general community, involve faculty and students in community-engagement activities, and is perceived as beneficial for both the academic and community partners.

William (Bill) Grisham, Hannah Whang Sayson, Natalie Schottler, and Marc Levis-Fitzgerald

**Neuroscience Evaluation of Undergraduate Realized Outcomes or N.E.U.R.O. Test v. 3.0**

We have identified the need to assess neuroscience programs and evaluate student gains. We have devised the N.E.U.R.O. test to measure learning gains of students traversing the curriculum. This test can chart the learning gains produced by individual students, individual courses, the entire major, and different demographic sub-groups. So, we can assess whether our pedagogical efforts are meeting the stated goals and expected learning outcomes. The N.E.U.R.O. test has 46 MC items and one free response. v. 3.0 has high reliability (> 0.83), generally reveals pre-post differences within a course, reveals differences between lower and upper division courses, and has been mapped onto the learning goals of our two majors, Neuroscience and Psychobiology. Future endeavors include trimming poor items, better mapping the test to learning goals, and utilizing it in other contexts. We’d like collaborators! —email: wgrisham@g.ucla.edu. Support from UCLA Center for the Advancement of Teaching, IIP grant #19-01.

Alexis Hill

**College of the Holy Cross**

**Assignment to develop a digital timeline of key opioid research articles spanning five decades**

Versions of this assignment have been used for two semesters of an intermediate Neurobiology course at a small undergraduate liberal arts school. Each student developed a summary of an assigned article on opioid research, spanning from the 1970s to 2019. Articles were chosen by the instructor to integrate several levels of neuroscience inquiry, while reinforcing key themes from the course, including molecular structure of receptors, intracellular signaling pathways, neuronal physiology, circuits, and animal behavior. Following generation of the timeline, students wrote a brief perspective, putting their assigned article in the context of other timeline articles, with an option to include articles outside the timeline.

There were many goals of this assignment. Students practiced reading and writing about primary literature while observing how a field progresses over decades, including reports of conflicting findings. The generation of a summary that would be shared with the entire class appeared to motivate students. The class consisted of 2nd through 4th year students,
and was intended to provide an entryway into primary literature for inexperienced students, while allowing more ambitious options for advanced students, particularly in writing their perspectives. Versions of this assignment have been used both during a traditional on-campus semester as well as remotely in Spring 2020, and worked well in both settings.

Marta M. Iversen, Mark R. Brinton, Tyler S. Davis, Jacob A. George
MI, TD, JG: University of Utah
MK: Elizabethtown College

Return of the Jedi Scientist: Feel the Force!
Understanding neural-engineering concepts typically requires expensive equipment and extensive training. Leveraging the popularity of Luke Skywalker’s bionic arm, we previously developed an inexpensive, hands-on laboratory exercise that allows individuals to control a bionic arm with their thoughts. Now, individuals can also feel a sense of touch coming back from the arm. Two electromyography channels are sampled (Backyard Brains) and visualized in real-time to control the arm. Forces exerted on the bionic arm are converted into electrotactile stimulation to allow users to experience sensations felt by the arm. Educational outcomes include: 1) understanding how/where to decode motor intent and encode artificial biological signals, 2) creating real-time control and feedback algorithms, and 3) designing experiments to quantify how sensory feedback impacts dexterity. This exercise has been validated with 70+ undergraduates. We are now collaborating to expand this exercise and ultimately inspire and train the next generation of Jedi Scientists and neural engineers.

Roshan Jain, Jamie Becker, Matthew Carrigan, Yongjie Gao, Alexis Giron, and Carlotta Pazzi
RJ, MC, YG: Haverford College
YG: Cornell University
AG: Bryn Mawr College
CP: Sidney Kimmel Medical School

Combining Inquiry-Based Behavioral Experiments with Collaborative Science Writing in an Upper Level Neuroscience Lab
Training in inquiry-focused scientific experimentation is a major focus of undergraduate lab courses to support career paths in experimental STEM. However, supporting deep experimental training can often come at the expense of developing written science communication skills that are also key to a broad array of STEM-focused careers. We thus adapted an upper level inquiry-based lab to feature iterative mentored figure design and manuscript writing throughout the course. In the lab, students explored the impact of serotonin on zebrafish decision-making and learning through CRISPR mutagenesis, pharmacological, and behavioral approaches. Throughout the entire semester, students also engaged science communication through multiple rounds of low-stakes drafts, peer review, and instructor review, of figures and manuscript text, followed by collaborative synthesis of work into a team manuscript. Assessment revealed improvements in students conceptual and experimental understanding as well as enhanced procedural comfort and skill at written scientific communication and collaboration.
Engaging neuroscience students outside and inside the classroom - the Open Educational Neuroscience Textbook

Open Access publications and Open Educational Resources (OERs) are new and exciting ways to publish research and pedagogical methods respectively. Within our neuroscience program we sought new ways to integrate current Open Access research and publications into our teaching curriculum by incorporating these topics into an OER through the co-creation of an online neuroscience OER textbook (https://ecampusontario.pressbooks.pub/neurosciencecdn2/). Senior level students in our neuroscience program curated, researched and wrote different sections of this textbook and helped to adapt others using the free Pressbooks platform. Additionally, the H5P plug-in for Pressbooks allows for online users to receive feedback on embedded questions that the students and graduate student editors helped to create. This type of co-creation project would be ideal for crowd-sourcing and editing of neuroscience related material and the students who were directly involved as well as students who have used the free etextbook in courses have rated their experience highly. Details of the workflow and challenges, as well as the overall reception of the OER will be discussed.

The UHD Flytracker Lab Exercise: Scaffolding Instruction for Course-based Undergraduate Research Experiences

Course-based undergraduate research experiences have emerged in recent years as an attractive model to broaden student access to authentic research. Successful CURE programs focus on skill development and recommend projects whose successes do not depend on student’s mastery of difficult lab techniques. In my lab, we developed a protocol using our own tracking software to analyze the locomotive behaviors of fruit flies in an open arena. In addition, we identified key skills in conducting this type of research and scaffolded respective skill training components to ensure student success. This protocol was piloted with a small group of summer research training students during the COVID-19 pandemic at University of Houston Downtown. We think it can be a model for CURE in an undergraduate neuroscience/behavior lab course.

Podcasting Neuroscience: A SciComm Undergraduate Project

Critical reading of primary scientific literature, and effective communication of scientific findings to a given audience, are vital skills for scientists to succeed. Furthermore, the current pandemic has highlighted the importance of all individuals to be able to effectively read and evaluate various forms of science communication. Yet, undergraduate students rarely receive explicit instruction in best ways to read primary literature or best practices in science communication. In this poster, I will discuss a semester-long project designed to help undergraduates gain skills in reading and translating scientific information for a
general audience. Students are tasked with identifying a neuroscience topic of interest, and researching, drafting, and recording a science communication podcast to present the findings of their literature review. I will share the assignment structure from a 400 level Neuropharmacology course as well as a Freshman Seminar course, samples of completed student work, and best practices for student success.

Ian F. Kimbrough
Virginia Tech School of Neuroscience

Hands-On, Minds-On: A State of the Art Undergraduate Neuroscience Laboratory Experience

At Virginia Polytechnic Institute and State University (Virginia Tech/VT), we have established a state-of-the-art undergraduate neuroscience laboratory series to teach the fundamentals of neuroscience with a hands-on, minds-on approach. These flagship courses provide VT School of Neuroscience students with an unprecedented opportunity to learn neuroscience concepts and techniques from the perspective of a research experimentalist. Students have access to state-of-the-art research-grade equipment and take part in PhD directed real-world neuroscience research utilizing techniques such as fluorescent microscopy, immunohistochemistry, electrophysiology, optogenetics, and brain-computer interfacing. These courses are designed to provide hands-on experience with a range of experimental strategies, laboratory techniques, and data analysis approaches used in neuroscience research. Lab exercises are chosen to involve students in both theoretical and practical problem-solving. Primary goals for the courses are to have students think like neuroscientists and to have them experience the excitement of research. Here we will present an overview of this novel undergraduate teaching platform.

Elizabeth C. Leininger and Helene Gold
New College of Florida (Sarasota, FL)

Deceived, Confused, or Peer Reviewed? Integrating Critical Information Literacy Concepts into a first-year Neuroscience course.

Information literacy is vital to distinguishing legitimate from pseudoscientific claims in daily life. Here we will describe a first-year appropriate curriculum for a semester-long investigation into Critical Information Literacy issues in Science research, with a strong focus on the Open Access landscape. Critical Information Literacy provides a framework to analyze the political, social, and financial factors that influence and control access to and production and use of information. We (a neuroscientist and information literacy librarian) collaborated to create assignments and lesson plans that explored deceptive Open Access publishing and the limitations of Google Scholar to provide students with meaningful insight into the pitfalls of navigating the scholarly conversation (which is confusing even for experienced scientists). This course, which satisfies a core Liberal Arts curriculum requirement for Science and is open to all majors, was an ideal opportunity to innovate instruction of an often-overlooked but increasingly important information literacy skill.
Rachel Penton  
University of North Carolina  
Pivoting a CREATE Method and Makerspace advanced neuropharmacology course to remote instruction mid-term

Alexia Pollack  
University of Massachusetts-Boston  
Deep versus Shallow Processing – A Learning and Memory Experiment for Online Platforms  

Information processing of words can be meaning-based (‘deep processing’) or appearance/sound-based (‘shallow-processing’). A simple experiment, conducted through email and online platforms, demonstrates that recall for a list of 24 words depends on the instructions given to students prior to hearing the words read aloud. Students in the deep-processing group were asked to write ‘yes’ or ‘no’ – is the word likeable/pleasant, while students in the shallow-processing group were asked to write ‘yes’ or ‘no’ – does the word contain an E or G. After a one-minute delay of counting backwards from 200 by threes, students had two minutes to recall as many words as possible. The deep-processing group (N=23) recalled 14 ± 4 words, while the shallow-processing group (N=21) recalled 8 ± 3 words – confirming that deep-processing leads to better word recall. The experiment also serves as an evidence-based starting point for a discussion of best study/learning practices.

Erin Rhinehart  
Susquehanna University  
Testing TopHat in the Time of the Coronavirus Pandemic, a new course delivery system that integrates lectures, immediate response systems, discussions, testing and attendance for a fully integrated, online instructional system.  

Before the coronavirus pandemic, undergraduate classes used systems like Blackboard, Moodle and Canvas to deliver online content, when they were suddenly forced to morph into totally online entities. Because I find face-to-face interaction with students to be the most fruitful aspect of teaching, this unexpected, mandatory shift to online education caused an uncomfortable reliance on, what I considered, my shabby online instructional capabilities. Fortunately, I had been working with an application called TopHat, allowing me to create an engaging online instructional system of interactive course content (PowerPoint presentations + live polls + discussions), built-in assessments and virtual classroom features. The system was intuitive and inexpensive, and it made me much more comfortable with my ability to deliver engaging content. So, while the initial time investment was significant, this application is extremely valuable for facilitating student learning and for reducing the stress involved in rapidly shifting from in-person to online classes.

Shannon Rodriguez and Elba Serrano  
New Mexico State University  
Networking with Hispanic Serving Institutions for STEM Student Success: The NSF HSI National STEM Resource Hub
The Hispanic Serving Institutions Program was established by the National Science Foundation in response to the American Innovation and Competitiveness Act and the Consolidated Appropriations Act of 2017. The HSI Program seeks to improve the quality of undergraduate STEM education at HSIs, to increase HSI student retention and graduation rates, and to build capacity at HSIs that receive little to no NSF funding. The NSF HSI National STEM Resource Hub, a collaboration between NMSU, CSUN, and DACC, serves as the first and sole Hub for the NSF HSI Program. The Hub is tasked with building a national network of HSIs and their allies by providing free and open access to tools for grantsmanship, capacity building, and STEM pedagogy. Here we show how HSI and non-HSI faculty and staff can utilize the Hub’s resources and online community to strengthen STEM education offerings and grant submissions, and to increase the success of students from diverse backgrounds. Supported by NSF 1832338 and 1832345.

Meg Upchurch
Transylvania University

Meeting behind the Seen: Synchronous Teaching without Virtual Meeting Fatigue

Videoconferencing platforms provide opportunities for synchronous teaching and interaction between classmates, but they come with disadvantages including video fatigue. Moreover, presenters using videoconferencing programs may feel as if they are lecturing into a void. In an online class in Behavioral Pharmacology, we used Google Meet essentially as a conference call in the background while the class “met” within a Google Doc that everyone could edit. This format permitted both oral and written discussions and gave the students easy access to links posted within the Google Doc directing them to pictures, videos, web pages, and separate Google Meet addresses for small group discussions. For both the instructor and the students, class interaction and engagement were enhanced by the students’ ability to add notes and comments to the common Google Doc. We used this technique for a synchronous online class, but it could be adapted to hybrid or asynchronous teaching.

Beth Wee
Tulane University

Online Neuroscience Instruction: Insights and Lessons Learned

This interactive session focuses on an online class, “Brain and Behavior”. This class is the first core course in the Neuroscience major and fulfills the biopsychology requirement for the Psychology major and minor. Thus, the background and interest levels vary widely among the students in the course. We will discuss preparation for the course (including use of CANVAS, YuJa, Adobe products, Zoom, and other useful software), review of a variety of individual and group assessments and participation activities, and results of student reflections/evaluations. The session will include Q & A with audience participants, to help them develop/improve their own online and/or hybrid courses.

Katie Wiens
Bay Path University

Brothers in arms: Case study to teach PTSD in introductory neuroscience course
The use of stories is one effective technique known to increase memory retention. The Neuroscience Case Network was created to develop new course modules for use in neuroscience classrooms, thereby increasing student engagement and long-term retention of course content. As a fellow within this network, I generated the “Brothers In Arms” case study centered around a news release that relates the story of two brothers who returned from war and suffered from PTSD. Students were required to complete the following tasks prior to the discussion:
read a portion of the textbook that explained PTSD, read a news release about two veteran brothers with PTSD, complete seven discussion questions related to the article, and generate potential changes to military protocol that might help prevent or better treat PTSD. During class, students were informed that they were Congress, and they were tasked to generate a passable bill that addressed their ideas for changes to military protocol. Students reported that they enjoyed learning about PTSD in this format, gained more knowledge than they would have if it was strictly a lecture format, and that the format caused them to think about PTSD in a unique way.

Suzanne Wood
University of Toronto

Introducing a small dose of neuroscience in a first-year seminar, both in person and online
Introducing neuroscientific concepts at the appropriate level is key to garnering interest among our students. First-year seminars offer undergraduates from all backgrounds and intended majors an opportunity to practice writing and discussion-based critical thinking early in their years at university. These seminars also emphasize community-building among the small group of students, as many of our other first-year courses enroll more than 1,500 students. Considering these parameters, I designed the first-year seminar, “Psychology and History of Drug Use”, to gradually introduce a small amount of neuroscience basics to students without a science background. In the face-to-face iterations of the course, I used group-based techniques, such as two-stage testing. Next year’s “dual-delivery” model, in which some students will meet in person while others will join in online, simultaneously, presents new challenges to engaging students in material they may find intimidating.
Friday, July 31st

11:30AM EDT – Keynote presentation

**Leveraging the Neuroscience of Now to Help ourselves and our Students Continue to Learn & Thrive**

**Dr. Mays Imad**  
PIMA Community College

**Abstract:** The latest research suggests that the underlying beliefs about learning are based in large part on misconceptions, over-interpretations, and misunderstandings, particularly in relationship to the brain and the role of emotions in learning. We are, to quote a recent international report, subject to “neuromyths” about how learning works (Betts et al, 2019). As the report makes clear, the prevalence of online information—and misinformation—means that the need for educators “to ensure that their practice is scientifically grounded and evidence-based” is now more important than ever.

In this interactive workshop we will consider research on metacognition, emotions, and stress and their effect on a student’s motivation and experience of learning. Importantly, in our current tumultuous times, we will consider a neuroscience lens as we, along with our students, continue to navigate uncharted territory.

**About Mays**

Mays Imad received her graduate training in Cellular and Clinical Neurobiology from Wayne State University-School of Medicine. She completed her postdoctoral training in Neurogenetics at the University of Arizona. She is the founding coordinator of the Teaching & Learning Center at Pima Community College where she also teaches and investigates the impact of stress on student learning.
## 1:00 PM EDT – Moderated Discussion of DEI topics

<table>
<thead>
<tr>
<th>Topic in Neuroscience</th>
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<tbody>
<tr>
<td>Diversity, Equity, and Inclusion in Introductory Neuroscience Courses</td>
<td>Alo Basu</td>
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<tr>
<td>Teaching about Race and Gender in Neuroscience</td>
<td>Mary Harrington</td>
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<td>How can we retain students from underrepresented backgrounds in science from freshman to sophomore year?</td>
<td>Michelle Mynleiff</td>
</tr>
<tr>
<td>From Deficit to Belonging: Creating Inclusive Classrooms and Programs</td>
<td>Michelle Tong</td>
</tr>
<tr>
<td>Inclusive Pedagogy</td>
<td>Monica Linden</td>
</tr>
<tr>
<td>Students as Partners</td>
<td>Barbara Lom</td>
</tr>
<tr>
<td>Developing and Supporting Students from Underrepresented Backgrounds, from Sophomore Year to Graduate School</td>
<td>Hewlet G. McFarlane</td>
</tr>
<tr>
<td>First-day Information Sheets</td>
<td>Amy Jo Stavnezer</td>
</tr>
<tr>
<td>Features of Successful Pipeline Programs for Diversity, Equity, and Inclusion in Neuroscience</td>
<td>Veronica Martinez-Acosta</td>
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<td>Institutional Detox: Shifting to a more equitable and inclusive faculty culture</td>
<td>Gerald Griffin and Kimberlei Richardson</td>
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## 2:00 PM EDT – Remote teaching tools 1

Pradeep George, Malin Sandström, Heather Topple, *Mathew Birdsall Abrams*
INCF, Stockholm, Sweden

**TrainingSpace: NeuroEducation without Borders**

TrainingSpace is an online hub that aims to make neuroscience educational materials more accessible to the global neuroscience community developed in collaboration with INCF, HBP, SfN, FENS, IBRO, IEEE, BD2K, and iNeuro Initiative. As a hub, TrainingSpace provides users with access to: Multimedia educational content from courses, conference lectures, and laboratory exercises from some of the world. As leading neuroscience institutes and societies; 4 study tracks (Neuroinformatics, Computational Neuroscience, Neuroscience, and Brain Medicine) to facilitate self-guided study; Tutorials/demonstrations of resources (tools, software, and services) available for neuroscience research; Neurostars.org, a Q&A forum; and KnowledgeSpace, a data discoverability portal/encyclopedia for neuroscience that provides users with access to
over 1.600.000 files of publicly available data and models as well as links to literature references and scientific abstracts.

William Heitler
University of St Andrews

Neurosim

Neurosim is a neural simulation program designed primarily for teaching. It is a low-cost commercial program.

The talk will demonstrate the program, and show how it can be used to help teach and reinforce understanding of core concepts in electrophysiology, from the sub-cellular to network level. Separate modules within Neurosim target HH spike mechanisms (including advanced multi-channel models), cable conduction, network interactions and compartmental models, and single-channel patch clamp recordings.

The Neurosim interface is intuitive and highly configurable, so students need only be exposed to information relevant to a particular learning objective. Parameters can be hidden so students have to discover them by designing and carrying out their own experiments. It can thus give students practice in interpreting and analysing realistic-looking neurophysiological data, and aid their critical understanding of the primary literature. It can also be used by students to build quite complex models as part of longer-term project-based learning.

Melanie P. Leussis, S. Lakshmi Haferman, Robert B. McCormack, and Madison Garnick
Emmanuelle College

Open educational resources – What’s available for neuroscience? Can digital textbooks be as effective as print textbooks in higher education?

The use of digital textbooks, including open educational resources, is increasing, as these are generally more affordable and accessible to students. However, there is ongoing debate as to whether performance is equivalent between standard paper textbooks and digital textbooks. This presentation will focus on three main elements: 1) currently available open educational resources for neuroscience education; 2) advantages and disadvantages of digital textbooks compared to standard print textbooks; and 3) a brief review of relevant evidence showing that, while a stated preference for printed textbooks persists among students and faculty, digital and printed textbooks do not differ in terms of performance among higher education students. The review of available open educational resources for neuroscience will focus on textbooks or similar course materials, and not on resources specific for lab classes, which are covered in detail in other parts of this conference.

Tamily Weissman
Lewis and Clark College

Making grant review real for students: Independent projects in neurobiology lab course are selected based on student-led review panel of their peers’ submitted proposals

I will describe the 6-8 week lab module that I use to help students learn how to navigate the grant review process. Students write grant proposals for a ~four-week independent research project to be undertaken in the lab class. Submitted proposals (anonymous) are reviewed by other students in the class. Each student acts as a reviewer, presenting and
critiquing another student’s proposal at a student-led grant review panel that is modeled after NSF review. (The grant-writing portion has been adapted from other colleagues at FUN.). Following the panel, there is an anonymous vote for proposals that students believe should be “funded”. Here’s the twist: the winning 2-3 proposals are then the ones that we do in the lab class for the rest of the semester. Students can pick which winning project they wish to work on. The students who originally proposed that project often become team leaders for the group of scientists working on aspects of their project. Since there is a real reward for writing a winning proposal, students report an increased understanding of proposal writing, peer review, and grant-funded research.

3:30PM EDT – Online labs 2

Brandon Calderon, ADInstruments

**Lt Neuroscience Labs in the COVID Era**

ADInstruments’ online learning platform, Lt, has historically been directed for blended, undergraduate learning environments. Students perform experiments in-person by collecting physiological data directly into Lt, access pre-lab materials, complete post-lab analysis and assessment, and review lab materials remotely. Because Lt also has integrated example data, many educators have been using this feature for students to analyze and complete entire labs remotely. This presentation will showcase lab structure, features, and benefits of the Lt platform for both educators and their students, with a focus on the twenty neurophysiology labs available in Lt. We will also present educator feedback on how Lt has helped lab classes continue in the COVID era, how to modify and create lab exercises within Lt, and provide considerations for promoting accessibility in remote lab instruction.

Mary Morrison
Lycoming College

**Online labs for Fluorescent immunocytochemistry or Western blotting: The next best thing to being there**

I created two virtual molecular neuroscience labs. The virtual immunocytochemistry experiment teaches the specificity of antibody staining, principles of fluorescent microscopy, and diversity of brain cell types and morphologies. It uses videos from the Journal of Visualized Experiments (JoVE) and student microscope images of mouse cerebellar cultures. Students analyze individual and overlaid images of Purkinje neurons (stained with Cy 3) and glial cells (stained with Alexa 488). No-primary antibody controls and DIC images for the same visual fields are included. The second experiment teaches SDS-PAGE and the specificity of Western blotting. It uses free, publicly available vendor videos and student gel and blot images revealing myosin or beta tubulin in tissue samples. Both experiments include questions students need to answer in their journal article-style lab reports for assessment. These virtual experiments can easily be adapted for any micrographs or Western blotting images you already have available--or use mine!
Denise R. Cook-Snyder and Daniel G. Ehlinger

DCS: Neuroscience Department, Carthage College, Kenosha, WI 53140;
DGE: University of Wisconsin- River Falls, River Falls, WI 54022

Writing and adapting case studies for synchronous and asynchronous online courses

Problem-based learning through the use of case studies is an effective active learning method that increases student engagement and is readily adaptable from in-person to remote learning environments. In this presentation, Neuroscience Case Network fellows (NeuroCaseNet; NSF-RCN-UBE Grant #1624104) will provide specific examples of how teaching with case studies can be incorporated into both synchronous and asynchronous online course structures. We will provide concrete examples of case studies that were successfully adapted for the Spring 2020 semester, and facilitate discussion of general strategies and best practices for writing and adapting case studies into remote learning environments.

Declan Ali

University of Alberta

Neuromembrane: A Simulator for Teaching Neuroscience

Undergraduate students often have a difficult time understanding basic neuroscience concepts such as the factors that give rise to the resting membrane potential, the action potential, the direction of ion flow across the membrane and the action of voltage-gated ion channels (Na+ and K+). Hands-on dynamic simulations are a useful pedagogical tool for overcoming learning barriers. Therefore, we designed and built (in collaboration with a programming company, Atmist Co.) a web-based simulator, called “Neuromembrane” using the Hodgkin Huxley models of ion conductances. The simulator allows students to see ion channel function and ion flow across cell membranes. Our goal was to allow students to alter key parameters of membrane function and make predictions in terms of ion channel activity, ionic currents, membrane potentials and synaptic activity. We wanted the simulator to be free and easily accessible, straightforward to use and easy to understand. In addition, we wanted students to easily upload or download their starting parameters and to print off results as PDF documents (for assignments). It is hosted on the web at the University of Alberta (https://neuromembrane.ualberta.ca/account/login) and is highly accessible via a Guest Login button. We wanted students to access the program from the internet via computer, tablet or smartphone and therefore chose not to build the simulator as a platform-specific application, but rather a web-based application. Programming modes include SciPy (open source) + Highcharts (JavaScript, free for educational purposes).

Neuromembrane has 8 Simulation Modes: Resting Potential, Action Potential, Voltage Clamp, Voltage Clamp I/V, EPSP, IPSP, Integration and Passive Membrane. We are currently improving the functionality of these modes and continuously adding to the program. The Neuromembrane Simulator has been used in classes at the graduate, undergraduate and high school levels. It has aided teaching and pedagogy by allowing students to see ion channel activity and ion flow across the membrane in a visually attractive and it has encouraged discussion and the ability to run thought experiments and make predictions about channel function has greatly aided learning in the classroom.
Eli Meir  
SimBiotic Software  
Action Potentials Extended: A SimBio virtual lab that helps students learn how electrochemical gradients produce membrane and action potentials  
Action Potentials Extended (and its shorter cousin Action Potentials Explored) are widely used in both introductory biology and neuroscience classes to help students learn about electrochemical gradients, reversal potential, membrane and action potentials, and how channels are used by neurons to control those. These modules are used both in-class and at-home. I’ll do a demo of Action Potentials Extended and show results from research on its effectiveness.

5:30 PM EDT – Diversity, Equity and Inclusion in Neuroscience 1

Ronald Bayline  
Washington and Jefferson College  
Using open book/open note exams for both in person and online learning  
I have been using open book/open note exams in my classes as a form of summative assessment for a number of years. When we transitioned to remote instruction in the past spring, moving these assessments into an online format allowed me to assess student learning while permitting students access to notes, books, or internet sources to aid their test-taking. These tests can also be used to assess higher level understanding since you can ask students to synthesize divergent ideas, analyze data and figures, and create experimental approaches. I will provide examples of the types of exams and questions that I used and some feedback from students. I welcome others to bring examples of other assessments used that worked in an online format for the discussion.

Lauren Stutts  
Davidson College  
Building Resilience: Results and Recommendations from a Study on Stress & Resilience in College Students  
College students report high levels of stress and depression, which can have significant negative health effects. However, many students demonstrate resiliency despite a number of challenges. Exploring both the struggles and the successes of students can help us determine what they need to thrive. This workshop will include the main results from a longitudinal study examining stress and resiliency in a class of college students over four years across four undergraduate institutions (Davidson College, Duke University, Furman University, and Johnson C Smith University). In addition, it will provide recommendations for practical strategies that faculty members can use to improve student well-being.

Jessica Good  
Davidson College  
Talking about Diversity in the STEM Classroom
Science, technology, engineering, and math (STEM) instructors who desire to create an inclusive classroom environment for Students of Color must decide how to talk about diversity in their classes. Two primary diversity philosophies (colorblindness and multiculturalism) have been investigated within the social psychological research literature. In this talk, I will present evidence from my NSF-funded research program showing the positive impact of multiculturalism, relative to colorblindness, on test performance for newly learned STEM content for Students of Color. I will also discuss the impact of instructor diversity talk on perceptions of the instructor’s bias. Time permitting, the floor will open for discussion of how to implement a multicultural philosophy in the classroom, particularly in light of both the COVID and racism pandemics.

6:30 PM EDT – Funding opportunities

Ellen Carpenter, NSF
Marguerite Matthews, NIH/NINDS

8:00 PM EDT – Themed socials

Please join a themed social to discuss captivating topics in neuroscience education. These are informal talks, led by moderators, to guide groups through questions within the topic. Start with one, and join another.

<table>
<thead>
<tr>
<th>Social Theme</th>
<th>Moderator(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advocacy in Neuroscience</td>
<td>Monica Linden</td>
</tr>
<tr>
<td>Assessment</td>
<td>Ronald Bayline</td>
</tr>
<tr>
<td>Adapting Case Studies to the Remote Classroom</td>
<td>Judith Ogilvie, Todd Watson, Caroline Wilson</td>
</tr>
<tr>
<td>Collaboration Tech for Synchronous or Asynchronous Teaching</td>
<td>Taffeta Elliott and Samantha Gizerian</td>
</tr>
<tr>
<td>Faculty of color affinity group and brainstorming session (This event is intended for BIPOC faculty. Please address questions or concerns to Alo Basu, <a href="mailto:abasu@holycross.edu">abasu@holycross.edu</a>)</td>
<td>Hewlet G. McFarlane</td>
</tr>
<tr>
<td>Supporting faculty of color</td>
<td>Michelle Tong</td>
</tr>
<tr>
<td>Getting tenure at PUIs</td>
<td>Julio Ramirez</td>
</tr>
<tr>
<td>Journal of Undergraduate Neuroscience Education (JUNE)</td>
<td>Raddy Ramos and Eric Wiertelak</td>
</tr>
<tr>
<td>NuRhoPsi</td>
<td>Margaret Gill and Michael Kerchner</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>-----------------------------------</td>
</tr>
<tr>
<td>Perusall</td>
<td>Deanne Buffalari, Meredyth Wegener, James Windelborn</td>
</tr>
<tr>
<td>Student Engagement and Community: Stories from the Virtual Classroom</td>
<td>Lisa Gabel and Taralyn Tan</td>
</tr>
</tbody>
</table>
Saturday, August 1st

11:00 AM EDT – Remote teaching tools 2
Paula Miles
University of St Andrews

**Investigating staff & student understanding of good academic practice**

It is imperative that students are educated about, and understand the importance of, good academic practice. Strict standards of academic integrity help to ensure that knowledge is attained in an honest and ethical manner, creating fairness for students, and ultimately enhancing the student experience. We sought to better understand student and staff views of what constitutes good practice and academic misconduct within four areas: collusion; multiple submission; contract cheating; plagiarism. Participants were presented with scenarios and asked to choose one of four possible responses to describe each scenario: good practice; poor practice; misconduct; unsure. Results showed that extreme ends of the academic practice continuum were well understood. However, some scenarios lacked consensus amongst both students and staff, highlighting a grey area on the academic practice continuum between acceptable and unacceptable practice. The most contentious areas of academic practice were those involving help from peers. This is important to consider given the increased utilization of group work within educational settings and recent increases in remote/online assessment due to the worldwide COVID-19 pandemic.

Ashley Juavinett
UC San Diego

**Jupyter Notebooks as a Teaching Tool in Neuroscience Courses**

Conducting neuroscience research increasingly requires coding proficiency and the ability to manipulate and analyze large datasets. However, these skills are often not included in typical neurobiology major curricula, often because of the barriers to entering competitive computer science courses as well as technical and financial difficulties in choosing and maintaining coding environments. Therefore, this session will introduce attendees to the ease of using Jupyter Notebooks for Python coding and data analysis in neuroscience courses. Along the way, I will provide a general framework on teaching coding to neuroscience students, introduce Jupyter Notebooks as a freely-available tool, and invite you to code alongside me to analyze open access electrophysiology data in the Allen Cell Types database. I’ll conclude by offering additional implementations of these activities for coding-focused or data science specific courses.

Deanne Buffalari
Westminster College

**Using worksheets to target student engagement and evaluation of progress during remote instruction.**

Faculty often only use worksheets to evaluate knowledge in the learner. Yet worksheets can be used in a variety of ways. This presentation reviews use of “guided” worksheets in
Introductory Psychology. These worksheets moved step by step and included examples, questions, and references to text and slides to aid students. The goals of these worksheets were: 1) to allow the instructor to gauge progress in students attending live sessions but also those engaged asynchronously, 2) to prompt student review of material, 3) to promote online discussions 4) to review for exams. Overall, despite some challenges, worksheets translated well into the online environment and provided indication of student understanding for the instructor while also keeping students engaged with the material outside the classroom.

12:30 PM EDT – Diversity, Equity and Inclusion in Neuroscience 2

Monica Linden, Jane Kruskop and Eva Kitlen
Brown University

Highlighting Diversity in Neuroscience through Course Content
In this talk, I will discuss low-effort interventions to showcase diverse neuroscientists in a lecture-based neuroscience course required for majors. Developed in conjunction with an undergraduate, slides showing diverse scientists and their work were added to undergraduate learning assistant-led course sections. Students overwhelmingly appreciated the slides, and it increased their awareness of the diversity of neuroscientists and their own sense of belonging. This was especially true for students who self-identified as underrepresented. A second undergraduate has expanded the slides to problems that will be incorporated into the course this fall.

Ian Harrington
Augustana College

Celebrating and Sharing Diverse Voices in Neuroscience
We are introducing a new forum in which to share resources that celebrate the diversity of those who have contributed to our field, past and present. Referred to as Project DiViNe (Diverse Voices in Neuroscience), its centerpiece is an online forum where we can share the biographies and professional contributions of neuroscientists and related practitioners from a wide range of historically underrepresented or marginalized groups. By humanizing and contextualizing a broader sample of those who have contributed to our discipline, we hope to better match the diversity of our students and, thereby, promote inclusion. Contributors can propose candidates to be profiled, identify possible collaborators, and develop resources to be shared through a dedicated blog on the FUN website. The blog format will allow for the rapid dissemination of these profiles. We also hope to periodically bundle and publish these resources in JUNE to increase their accessibility for the broader community.

Alo Basu
College of Holy Cross

Curricular barriers to undergraduate participation in neuroscience
In what ways might the structure of undergraduate curricula present barriers to participation in neuroscience? What are the prerequisite courses for an institution's
introductory course? What course(s) must a student complete to gain entry to an institution's neuroscience program or community? What required courses are most challenging for students to complete as part of a curricular focus in neuroscience? We will briefly discuss these questions as a primer/introduction of a brief survey to identify common curricular gateways and challenges in undergraduate neuroscience curricula.

1:30 PM EDT – Online labs 3
Kaitlyn Casimo
Allen Institute
Enhancing student research experiences using the Allen Brain Map
The Allen Institute is a nonprofit research institute located in Seattle, dedicated to unlocking the complexities of bioscience and advancing our knowledge to improve human health, with core research areas in neuroscience, cell biology, and immunology. As part of our mission of supporting open science, we are sharing all the data, analysis tools, and findings from our work freely and publicly with the scientific community. Because all of our resources are openly available online, they can be easily and freely used as a primary data source for students in lab-based courses who are distance learning, or they can supplement data collected in a lab course taught in person. Most analyses can be conducted in the browser or with free software such as ImageJ, Python, or R.

In this session, you will learn about some of the open resources available from the Allen Institute for Brain Science, how to access those resources and accompanying analysis tools, and about some of the methods used in the development of these resources. We will review sample research questions for using the open data resources both as the primary data for student-led research and to supplement data collected in lab courses or research labs. We will also review our classroom materials developed to help educators start using the open resources for teaching.

Marc Nahmani
University of Washington, Tacoma
Fast, free, & 3D: Designing and implementing versatile CUREs using freely available 3D image volumes
Course-based undergraduate research experiences (CUREs) using inquiry-based methodology provide a range of positive benefits to undergraduates and instructors. Yet, the required time and cost in designing and running CUREs can lead to barriers in CURE implementation. In this workshop you will learn how to organize and deliver an alternative approach to CUREs that utilizes free, open access 3D image volumes as data-rich resources for neurobiology CUREs. These open access image volume CUREs (ivCUREs) effectively combine the data acquisition and analysis steps within the course, allowing more time for students to critically evaluate their hypotheses and results, compare data with peers, and reflect on their experiences. Undergraduates in these ivCUREs acquire an understanding of neuroanatomy and quantitatively analyze target features within their image volumes to relate their potential importance to neuronal function. Key benefits to ivCURE implementation include the (1) low-cost of experimental design and
implementation, (2) potential to generate publishable analyses, and (3) flexibility to scale projects and class sizes. In addition, ivCUREs fit seamlessly into a ‘distance learning’ environment since all student data acquisition and analysis steps are run from a personal computer with limited need for online access. ivCURE opportunities will grow in parallel with the increased availability and diversity of open access image volumes and tools.

Robert Wyttenbach
Emory University

**Video microscopy for teaching**

Video in the teaching lab can illustrate procedures in real time and record them for future use. However, getting the right combination of microscope, camera, and camera adapter can be confusing. The standard adaptor recommendations (0.5x adapter for a 1/2” sensor, 0.33x for a 1/3” sensor, and so on) are intended for photography rather than video. Such a combination makes video difficult because the camera captures only a small fraction of the visible field. This presentation will show how to tailor a setup to your needs, based on the camera, microscope, and aspect ratio of your display. I will give background, explain the calculations involved, and demonstrate with a microscope and several adapters and cameras. An interactive spreadsheet calculator will be provided. Options for recording video into files will be discussed.

Sally Seraphin and Shannon Stock
Trinity College and College of the Holy Cross

**Non-disposable assignments for teaching neuroscience through data analysis**

To provide meaningful research exposure while allowing students to practice scientific discovery and communication in a remote learning context, instructors can assign Non-Disposable Assignments (NDAs) whereby students design research projects, extract and analyze data from public sources, and share their findings. Unlike typical course assignments (e.g., lab-reports, tests) remaining in the student-teacher dyad, NDAs (e.g., disseminated presentations, visualizations, manuscripts) are associated with enhanced learning. Further, NDAs are a means by which to facilitate integrating diverse student perspectives in the creation, analysis and dissemination of neuroscience. To support the adoption of this pedagogical innovation, we describe two example NDAs based on published neuroimaging and psychophysiology experiments that have readily available data sets. In the process, we review other potential data sources that are amenable to teaching neuroscience and introduce two user-friendly tools, RStudio and R-markdown, for remote teaching and learning through data analysis.

3:30 PM EDT – Core concepts and competencies

Jean Hardwick
Ithaca College

**Core Competencies in Undergraduate Neuroscience: Meeting Goals during Remote Learning**
The Society for Neuroscience Training Committee has recently developed a series of Core Competencies for Neuroscience training at the undergraduate, graduate, and postdoctoral level (https://www.sfn.org/careers/higher-education-and-training/core-competencies). In this session, we will examine the core competencies for undergraduate training, with specific emphasis on how to train and assess students in these competencies during a period of remote learning.

*Jennifer Schaefer, Audrey Chen Lew, Kimberley Phillips, Patrick Sonner*

AL: University of California, Irvine
KP: Trinity University
JS: College of St. Benedict/St. John’s University
PS: Wright State University

**Neuroscience Core Concepts**

Several scientific disciplines have identified undergraduate educational core concepts for their respective fields. Core concepts are overarching principles that organize knowledge and can be applied to all sub-disciplines in neuroscience. These core concepts are tremendously useful in curriculum development and assessment. Neuroscience has yet to construct such a list.

A group of FUN members conducted a nationwide survey to solicit suggestions for core concepts in undergraduate neuroscience education from neuroscience educators. The group generated a preliminary list of neuroscience core concepts based on the survey results and presented the core concepts to neuroscience educators for feedback and revision in a FUN Summer Virtual Meeting satellite session on Thursday, July 30. This talk will present the methodology and results of the survey, the preliminary list of core concepts, and a summary of the feedback gathered at the satellite session.

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4:30 PM EDT – FUN Presidential Plenary
Mary Morrison, Kurt Illig, and Ron Bayline

5:30 PM EDT – Closing
Alo Basu and Jason Chan

Thank you for attending the FUN Summer Virtual Meeting! We look forward to reuniting again, in-person.