



14th Annual

Hardware and Software Experiments to Teach Undergraduate Neuroscience - Curriculum Development Workshop (15-17 July 2020)

Partial costs for qualified participants paid from a grant during 2020 – details below

The University of Missouri-Columbia Colleges of Engineering and Biological Sciences will host a 3-day interdisciplinary workshop focused on active learning in neuroscience using virtual (software) labs from Wed-Fri, July 22-24, 2020 on the Columbia campus. This workshop is targeted to undergraduate faculty from biological sciences, psychological sciences and engineering and to high school teachers with an interest in teaching and learning more about neuroscience using software-based instructional modules. The workshop was initiated in 2007 as part of a National Science Foundation grant to MU to develop undergraduate curriculum in the area of computational neuroscience, and continues to be offered free beyond the duration of the grant.

In recent years, Computational Neuroscience has developed tools to abstract and generalize principles of neural function using mathematics. These tools have proven powerful for research in a wide neuroscience spectrum including molecular, cellular, and systems levels. However, computational methods also provide valuable tools for teaching neuroscience. Several comprehensive, yet easy to use software packages to model neurons and networks, which can be used in teaching, are available at low costs. Neural models can be used alone, or together with simple biological experiments to demonstrate basic neurobiological concepts, and give students hands-on experience, to significantly improve the student's learning experience.

The workshop will introduce one hardware and seven software experiments in the form of 'virtual labs' which can be directly incorporated into existing neurobiology or physiology courses, or used for the development of new courses. The hardware experiment covered in the workshop uses the low-cost spiker box from Backyard Brains (<https://backyardbrains.com/>). Workshop participants are supplied with 'ready to use' electronic versions of all hardware and software experiments, and of all the lectures.

TENTATIVE SCHEDULE FOR THE TWO-DAY SUMMER WORKSHOP

July 22:	7:00 p.m. - 9:00 p.m.	Registration, Introduction, What is a software experiment?, Basics of neurobiology, followed by social hour
July 23: (Thurs)	8:00 a.m. - 12:00 noon	The giant fiber system of the earthworm: Hardware experiment to demonstrate and study the properties of action potentials (AP), AP conductance, synaptic transmission, neuronal networks, and escape reflex
	1:00 p.m. - 5:30 p.m.	Software experiments 1-7: Nernst and Rest potentials; Action potential; Synaptic transmission, etc. using LESSONS developed with the package NEURON (free software available from Yale/Duke)
	7:00 p.m. - 10:00 p.m.	Workshop dinner – Location TBD
July 24: (Fri)	8:00 a.m. - 11:00 a.m.	Software experiments 1-7.... continued
	11:00 a.m. – 12:00 noon	Hands-on experiments related to recording of brain waves using EEG electrodes
	1:00 p.m. – 5:00 p.m.	Hands-on expts. + Software experiments.... continued + Wrap-up

What will you get? Modules of 'software' experiments and one hardware experiment for use in a variety of courses in areas such as: physiology, psychology, engineering,and even at the high school level; plans for building low cost neurobiology equipment for teaching and research; introduction to using software for experiments, 'quantitative thinking' in neuroscience; familiarization with the software package NEURON which is a powerful tool for teaching and research; contacts and camaraderie with like-minded scientists and educators in the region; participation in a neuroscience support-network.

Location and accommodation: The workshop will host 10 faculty, and will be conducted on the University of Missouri-Columbia campus. **Accommodation is available in University dorms which has single and double occupancy rooms. Or you can stay outside campus and make your own arrangements.**

Cost: **During 2020, we will cover expenses associated with lodging + meals at University dorms. If you decide to stay off campus, we can only reimburse at the dorm rate/day. Note that you will be responsible for covering all travel and other associated costs.**

Eligibility & Application process: Faculty at 2-year and 4-year colleges and universities, and high school teachers with interest in teaching neurobiology are eligible to apply. Limited support is available for US citizens and green-card holders. To apply, just complete the on-line application form at the site - <http://engineering.missouri.edu/neuro/outreach/neuroscience-workshop/>

For further information about the workshop, contact Drs. Satish S. Nair (573-882-2964; nairs@missouri.edu) or David J. Schulz (573-882-4067; schulzd@missouri.edu).

Application Deadline: Marcy 31, 2020.