



## Sixth Annual Hardware and Software Experiments to Teach Undergraduate Neuroscience - Curriculum Development Workshop (25-27 July 2012)

The University of Missouri-Columbia Departments of Engineering and Biological Sciences are sponsoring a two-day interdisciplinary workshop focused on novel curriculum development in neuroscience will be held Wednesday- Friday, July 25-27, 2012 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. The workshop was initiated as part of a National Science Foundation grant to MU to develop undergraduate curriculum in the area of computational neuroscience.

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 packaged lessons 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 can be custom build locally at low cost (all instructions to build it will be provided). Workshop participants are supplied with a CD that has 'ready to use' electronic versions of all hardware and software experiments, and of all the lectures.

### SCHEDULE FOR TWO-DAY SUMMER WORKSHOP

July 25:	7:00 p.m. - 9:00 p.m.	Registration, Introduction, What is a software experiment?, Basics of neurobiology, followed by social hour
July 26: (Thurs)	8:00 a.m. - 12:00 noon  1:00 p.m. - 5:30 p.m.	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  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)
July 27: (Fri)	7:00 p.m. - 10:00 p.m. 8:00 a.m. - 11:00 a.m. 11:00 a.m. - 12:00 noon  1:00 p.m. - 3:00 p.m. 3:00 p.m. - 3:30 p.m.	Dinner – on your own; suggest Les Burgeois, Rocheport, overlooking the beautiful Missouri river Software experiments 1-7... continued Introduction to the Crustacean Stomatogastric Ganglion (STG) – a system to study neuronal function from molecule to network levels + you develop a model for the experimental trace supplied to you as Software Experiment 7 Software experiments 1-7... continued Closing session: Suggestions for future workshops, follow-up meeting, etc.

(Light breakfast from 8:00-8:30 a.m. and lunch from 12-1 will be provided each day; Dinners to be covered by attendees)

**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 comradeship with like-minded scientists and educators in the region; participation in a neuroscience support-network.

**Location and accommodation:** The workshop will be conducted on the University of Missouri-Columbia campus. Participants arrange for accommodations on their own in Columbia (see <http://www.visitcolumbiamo.com/>).

**Cost:** Please note that there is NO fee for the workshop. However, to defray costs for catered breakfast/lunch/snacks, each participant will be charged a fee of \$45.00 (check payable to 'University of Missouri'). Attendees are responsible for lodging arrangements.

**Eligibility:** Faculty at 2-year and 4-year colleges and universities, and high school teachers with interest in teaching neurobiology are eligible to apply. To apply, submit the following by electronic or paper mail: (i) a 1-page statement of interest– indicate course(s) you teach or plan to teach, and how the workshop may possibly enhance it (not required), and (ii) curriculum vitae, to Dr. Satish Nair, 229 Engineering Building West, Electrical and Computer Engineering, University of Missouri, Columbia, MO 65211; email: [nairs@missouri.edu](mailto:nairs@missouri.edu).

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

Application Deadline: June 30, 2012.