

Jeff Gauthier

Application to Topics in Computational Neuroscience

Background

My educational experience is evenly balanced between empirical knowledge and theory. My undergraduate training was in two areas: biology (primarily neuroscience), and theoretical math (e.g. analysis, algebra, and combinatorics). My graduate program, Computational Neurobiology, emphasizes interdisciplinary learning, and I've studied neuroscience at the molecular, cellular, and cognitive levels, as well as some biophysics and nonlinear dynamics.

In my Ph.D. thesis lab, I am equally involved in conducting experiments and developing a clear quantitative understanding of their results. I run all my own experiments, from dissection to data collection, and I'm currently planning with my advisor how to tackle nontrivial statistical problems in the analysis.

Though I've joined a thesis lab and begun very narrow, specialized work there, I have not forgotten that I am a *student* and am responsible for continuing to learn about diverse aspects of computational neuroscience, including those unrelated to my thesis work. New ideas are always coming forward, and I see this course as a way to deepen my understanding of more of them. Though some information can be gleaned from texts and papers, there is no substitute for personal interaction with leading researchers.

Broadening My Background

My own background is in the more computational aspects of neuroscience, and so I've taken courses in experimental neuroscience outside the required curriculum. One was a reading class of historical papers, beginning with Hodgkin and Huxley and moving forward through the development of neurophysiological techniques and ideas, covering the evolving understanding of ion channels and the discovery of chemical synaptic transmission. Another course, one I'm taking currently, places a nontraditional emphasis on the importance of visual pathways aside from the geniculostriate.

When I've felt I didn't understand an important topic, I've taken matters into my own hands. Though information theory is frequently discussed in papers and at seminars, it is rarely taught in courses, so last year I organized a lectures series on information theory with another student. The sessions were informal and led by students or the occasional faculty member, and I read enough to give a lecture myself even though I hadn't previously encountered information theory in a formal setting. Last summer I was turned on to the possibilities of applying engineers' quantitative tools to neuroscience, and I organized a similar series on control systems theory, bringing in a few engineering students and faculty to help me plan and to give some of the lectures.