Teaching and Mentoring Statement

David M. Smith

Teaching is an exciting and rewarding part of my job. I enjoy interacting with undergraduate and graduate students and I like to share my enthusiasm for cognitive and behavioral neuroscience with them. It's particularly rewarding to see students begin to develop competence and enthusiasm for neuroscience. This was reinforced when I received a Stephen H. Weiss teaching award in 2018. My goal is to help students develop the critical thinking skills needed to understand how the pivotal ideas of neuroscience have evolved, to understand the evidence and nature of ongoing debates and controversies in the field and to understand cutting edge neuroscience research. In short, I want students to understand how neuroscientists think and how they conduct research. All of my courses rely on primary literature and discussion is encouraged, even in my large lecture class.

Psychology 3240, **Behavioral Neuroscience Laboratory (2015 – present)**

This lab class is designed to serve as a hands-on introduction to behavioral neuroscience, involving a variety of procedures and techniques with several different animal species. By performing these experiments, students gain deep insight into the structure and function of the nervous system, how neurons and neural circuits work, and how complex functions such as memory and vocal communication are produced by the brain. This is truly a one of a kind class where undergraduate students perform experiments on neurophysiology in giant cockroaches, spatial navigation and the role of the hippocampus in rats, and hormonal control of singing behavior in canaries. During these experiments, the students learn basic neuroanatomy, neurophysiology, behavior and histology. The students even perform intracranial drug infusions in rats and surgical implantation of subcutaneous testosterone capsules in canaries.

Naturally, animal welfare is a significant concern for this course. We discuss the ethics of animal research and the responsibilities of caring for animals throughout the course and all students complete detailed online training provided by Cornell Center for Animal Resources and Education. At the beginning of the semester, I have a lecture about animal care and procedures from our attending veterinarian. I designed the course in consultation with the Cornell animal care committee and veterinarians to ensure that the experimental procedures were safe, manageable for students, and provided an ideal opportunity to learn key behavioral neuroscience concepts. Students receive extensive and systematic training with models before they perform any procedures. As a result, we have not had a single adverse incident. I designed the course so that students start with simple procedures and work their way up to more complex procedures. This allows students to develop their technical skills and more importantly, allows them to make mistakes in a low pressure situation before attempting more difficult procedures (e.g. surgery performed on cockroaches early in the semester ensures that the students are ready for the hormone capsule implant surgery in canaries later).

Student response to the course has been uniformly positive, with consistently high ratings on student evaluations, and many students have spontaneously mentioned that this was the best course of their entire college experience.

Psychology 4230\6230, Navigation, Memory and Context: What Does the Hippocampus Do? (2006 – present)

This course is for advanced undergraduate and graduate students. Although the hippocampus has been the subject of intense scrutiny for nearly fifty years, there remains considerable disagreement about functional contributions the hippocampus makes to learning and memory processes. This seminar examines the diverse functions attributed to the hippocampus with an eye toward integrating the differing viewpoints in the literature. After a brief historical overview, students discuss cutting edge literature on the hippocampal role in spatial navigation, learning and memory, and context processing.

Students read and discuss primary literature articles each week. Students are also responsible for doing in depth literature review on a subtopic having to do with the hippocampus and presenting the resulting information to the class. Students also turn in a detailed annotated bibliography covering all of the articles they read for their presentation. Grades are based on class participation, the presentation and the bibliography.

Psychology 6271, Computational and Neural Systems (CNS) Journal Club (formerly called Behavioral, Computational and Systems Neuroscience Journal Club, 2006 – present).

This is a journal club style seminar, designed to provide a forum for the discussion of cutting edge articles with the field of behavioral, computational and systems neuroscience. The CNS journal club is co-organized by me and Thom Cleland Attendance typically ranges from about 8-15 participants, including most Behavioral and Evolutionary Neuroscience faculty and students. It currently serves as a discussion forum for research of interest to the entire BEN group.

Topics vary from semester to semester, but are often centered on questions about the nature of representation in sensory and memory system, evolution and behavior, new methods for decoding and understanding the information contained within spike trains, computational models of sensory systems and memory systems. In addition to the standard presentation of recent articles, we have had presentations from Cornell graduate students and postdocs, as well as from visiting postdocs and faculty.
Additional information and an archive of previous meeting topics can be found at the BCS Journal Club website:
(https://confluence.cornell.edu/display/BCS/Cognition+and+Neural+Systems+%28CNS%29+Journal+Club).

Psychology 2230, Introduction to Biological Psychology (2006 – 2013)

Enrollment is approximately 120-160. About 40% of the students are psychology majors and the class is commonly used to fulfill the requirement of at least one Behavioral and Evolutionary Neuroscience class for the major. This is a survey of biological psychology, which includes basic neuroanatomy and neurophysiology, neurotransmitter systems and neuropharmacology, the neurobiology of sensation and perception, motor systems, neural bases of psychological and neurological diseases, learning and memory and cognitive neuroscience. Starting in the Fall of 2013, a Writing in the Majors section of the class will be offered.

This is primarily a lecture course. After the first few lectures on basic anatomy and physiology, which follow the text fairly closely, I begin to incorporate findings from the primary literature into the lectures. Nearly all of the following lectures contain material from a variety of sources, including recent findings from primary literature, images and figures from advanced texts, and explanations of items from the news and popular press. Many lectures are composed mostly of material that is not in the text.
Students are responsible for material from the text and from lectures. I post lecture notes on black board prior to the classes. The syllabus, assignment instructions and grades are also available throughout the semester.

I think it's very important for students to write, even in large lecture classes, so I require two brief writing assignments. The first requires students to select from a large collection of online 'for public consumption' articles published by the Society for Neuroscience. The students use this article as a starting point for an internet search on a biological psychology topic of their choosing. The students then write a 2-3 page paper on their findings. This is an open ended assignment designed to encourage students to learn a little extra about a topic of interest to them. The second writing assignment involves selecting a primary literature article from a collection I provide. The students write a 2-3 page paper, including a summary of the research question, methods and major findings of the article. This assignment gives students exposure to scientific literature.

Student grades are based on performance on three preliminary exams, the lowest of which is dropped, a comprehensive final exam and two writing assignments. I think the difficulty level of the material is appropriate. In the end, most of the students do well in the class. However, they usually have to work quite hard for their grade. Student comments indicate that the class is generally regarded as difficult and demanding but that there are reasonable opportunities for students to be successful.

I have been pleased with the level of enthusiasm the students bring to the course. Student interest varies and the students come from different academic backgrounds. Nevertheless, the students are generally quite engaged. Attendance is very good and, with a little encouragement, they ask many insightful questions. At the beginning of the semester, many students admit to attitudes ranging from

disinterest to outright anxiety about learning biology. It's particularly rewarding when some of these same students later tell me that they were surprised to find that they were capable of learning the material and even developed a real interest in biological psychology.

Psychology 4200\6200, Advanced Topics in the Neurobiology of Learning and Memory.

This course is for advanced undergraduate and graduate students. This seminar examines the neural mechanisms of learning and memory processes, broadly defined to include simple and complex forms of learning in humans and animals. After a historical overview, students discuss cutting edge literature on the brain mechanisms of learning and memory. Topics are decided upon by the participants and have included the cellular mechanisms of plasticity (e.g. LTP), episodic, semantic and procedural memory, cognitive neuroscience approaches (e.g. fMRI), neural mechanisms of Pavlovian conditioning and instrumental learning, spatial memory, emotional memory, working memory, episodic and semantic memory, and the influence of hormones (e.g. estrogen) on memory.

Students read and discuss primary literature articles each week. Students are also responsible for doing in depth literature review on a subtopic having to do with the hippocampus and presenting the resulting information to the class. Students also turn in a detailed annotated bibliography covering all of the articles they read for their presentation. Grades are based on class participation, the presentation and the bibliography.

Neurobiology and Behavior 7210, Introductory Graduate Survey in Neurobiology and Behavior.

Each year I give a lecture for one of the weekly topics for this graduate course on current research in neurobiology (2007/2008 - present).

Neurobiology of Learning and Memory Laboratory Meeting

This is my weekly laboratory meeting, which is required for all lab personnel. In addition to dealing with day to day issues of the lab, the meeting also serves as a weekly seminar to provide the background knowledge students need for their research. Each week, we read and discuss a research article that is relevant to ongoing research projects in the lab. The lab meeting is also a forum for graduate students and advanced undergraduates to present their findings to the group.

Mentorship

One of the most important ways to contribute to the scientific community is by training the next generation of scientists. I try to maintain a careful balance between hands-on training and regular supervision of student research activities on one hand, and giving students the necessary freedom to develop independent research interests and skills on the other. Often, this must be tailored to the specific needs of

each student. I closely supervise students and postdocs during the early part of their training and, as they develop expertise, I encourage them to become progressively more independent. Because training in grantsmanship is so critical to a research career, I require that each of my graduate students and postdocs write an NIH National Research Service Award proposal. This also provides an early opportunity for students to begin to develop their scientific writing skills. I check in with students in the weekly group meeting mentioned above and I schedule weekly one on one meetings with each graduate student and postdoc. Of course, I am nearly always available for additional meetings with students as needed.

I have been a mentor to students at all levels, including undergraduate students, graduate students and postdoctoral researchers. I have also provided opportunities for senior scientists to obtain sabbatical training in my laboratory. Each is listed at the end of my Service Statement. I have directly supervised five postdoctoral researchers, eleven graduate students and numerous undergraduate student researchers, including more than 25 undergraduate honors projects.