INSTRUCTOR:  
Dr. Lisa Mangiamele  
Office: Sabin Reed 453  
Phone: 413-585-3879  
E-mail: lmangiamele@smith.edu

CLASS TIME AND LOCATION:  
Tues, Thurs 10:30 – 11:50 am  
McConnell 102

Office Hours: Mon 1:00 – 3:00 pm, and by appointment

REQUIRED READINGS:  


PDFs of other required readings will be made available throughout the semester on Moodle.

COURSE DESCRIPTION:  
Systems neurobiology is the study of how the brain functions as an integrative machine; in other words, how does the brain take in information from both its external and internal environments, make sense of it, and produce complex behavior? The development of new technologies to image the brain, measure and manipulate neural activity, and understand whole-brain patterns of gene expression means that our knowledge of systems neurobiology is growing rapidly. Though details may change over time, the questions that systems neuroscientists ask remain the same: How do animals sense and move within their world? Can brain anatomy or connectivity tell us anything about how and why individuals behave as they do? Why does behavior change with experience, age, injury, or disease? In many cases, the answer to these questions is still largely unknown. Thus, the major goal of this class is to teach you what types of questions to ask and what approaches to use to find their answers. Because we will be constantly wrestling with unsolved problems, you will come away from this course with a better ability to communicate to others what we know, and what we don’t know, about nervous system function.

COURSE OBJECTIVES:
1. To understand the nature of systems level structure-function relationships in the nervous system.
2. To become familiar with some technologies used to study neural responses, connectivity, and image the brain.
3. To practice reading scientific journal articles and critically evaluating research results, with the ultimate aim of forming your own opinions about the topics under study.
4. To develop skills in presenting and discussing the results of scientific studies.
COURSE ORGANIZATION:
Our work in this course will be divided into four units, each guided by a big, largely unanswered question in systems neurobiology:

1. Is the human brain unique?
2. What is synesthesia?
3. What’s the best cure for Parkinson’s disease?
4. Why do some brains (animal or human) possess capacity for language and others don’t?

Through these four questions, you will explore topics in vertebrate neuroanatomy/brain evolution, sensory coding, motor systems and motor disease, and language. Each unit will kick off with a brainstorming session, during which the class identifies student-driven questions about a biological phenomenon that will motivate the work that we do. Together, we will then decide on the “Question(s) of the Week” and we will use research practices to gather and share evidence that will help us to figure out something about the biological phenomenon – which might lead to more questions, and additional searches for answers! Our exploration might therefore look like this:

This type of teaching and learning approach is called “storylining,” and it requires students to be active partners in the learning process. Therefore, you need to come to EVERY class prepared to participate, share information, and ask questions. Your instructor will be there to guide you through the process of finding answers to your own questions.

RESOURCES:
Course materials (i.e., scientific journal articles, other readings, movies, handouts, and PowerPoint lectures) will be posted online using Moodle http://moodle.smith.edu. PDFs of reading assignments will be organized by topic.

We may use several websites and mobile apps as supplemental tools in our learning. Here are two that I have found helpful:

3D Brain Mobile App (Go here to download: http://www.dnalc.org/resources/3dbrain.html)
Allen Brain Institute Home Page http://www.brain-map.org
ASSIGNMENTS AND GRADING:

All reading and written/oral presentation assignments and their due dates are on the Course Schedule, which is posted on Moodle.

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<thead>
<tr>
<th>Assignment Type</th>
<th>Weightage</th>
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<tr>
<td>Student-Led Class Discussions</td>
<td>25%</td>
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<tr>
<td>Reading Responses</td>
<td>20%</td>
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<tr>
<td>Writing Portfolio</td>
<td>45%</td>
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<tr>
<td>Class Participation</td>
<td>10%</td>
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Final course grades will be determined as a percentage of the total possible points as follows:

- **A** 93-100%
- **A-** 90-92%
- **B** 83-86%
- **B-** 80-82%
- **C** 73-76%
- **C-** 70-72%
- **B+** 87-89%
- **C+** 77-79%
- **D** 60-69%
- **E** < 60%

**Student-Led Class Discussion**: A major component of this course will involve reading, interpreting, and discussing scientific research articles that will help us construct a best explanation for the phenomenon under study. Twice during the semester, you will work in a small group to lead a class discussion.

Here’s how we’ll organize the discussions:

1. Choose an article that may provide insight or an answer to the “Question(s) of the Week” and get approval from your instructor.

2. Produce a product that will engage your classmates in the phenomenon under study in your chosen article. The product might be a Powerpoint presentation, a video, a physical model, a group activity – be creative!

3. Lead a class discussion (approx. 1 hr of class time). See separate handouts for more instructions and tips on how to effectively prepare for your discussion.

You will be graded on how accurately you identify important issues raised by the article, how well you engage your peers in discussion and facilitate interaction, and how well you can help the class figure out something about our phenomenon.

**Reading Responses**:

If you are not presenting an article to the class, you will briefly (one page **MAXIMUM**) respond to a set of questions about the article that your classmates are presenting. The point of this assignment is to help you to develop your skill in critical analysis of scientific research, as well as to practice writing in a clear and concise way. This assignment is not meant to be a summary or report of the article; you are being asked to think critically about what makes the study relevant to answering our question(s), what makes it convincing or not convincing, and where you think this research could go in the future.

Your responses to the following questions are due by 11:00 pm on the night **BEFORE CLASS** so that I can read them before we meet. A reading responses consists of:

- In a few sentences, what **general issue** does the study address, and **how does it relate to the Question of the Week**?
In a few sentences, describe the **major result(s)** reported in the paper. Then, answer the following questions: **Are you convinced by the results? If not, why? How do these results help you improve your explanation of the phenomenon under study?**

- List **THREE** new questions that you have, or suggestions for future research on the topic.

No late reading responses are accepted, but you get full credit for handing in a completed, thoughtful assignment by the deadline. You may choose to not complete **two** of these assignments per semester without penalty. If you complete all assignments, your 16 highest grades on this assignment will count towards your final grade in the course.

**Writing Portfolio:**
Because we will be building our knowledge by grappling with questions that are largely unanswered, the major assignment in this course is a portfolio of four essays that will describe what you think is our best answer for each of the four big questions that guide this course. You are responsible for your own knowledge-building, but your answer should be informed by the ideas that we discuss as a community. Therefore, each essay will be part explanation of a biological phenomenon (e.g., *What is the story? How do you explain this?*) and part individual reflection (e.g., *How did your explanation of the phenomenon improve?*). This major writing assignment will be divided into intermediate deadlines, with one essay due at the end of each unit in the course. The first essay will not be graded, and you will receive feedback on your writing throughout the semester. More information and a rubric will follow in a separate handout.

**Participation:**
Active participation in the classroom will directly correlate with what you learn from this course, as well as the success of the course as a whole. You are expected to attend all classes. Participation is not the same as attendance, and students will be evaluated on their quality of engagement in classroom discussions and group activities. Your class participation will be graded according to the rubric/class rules that were agreed upon by all students in the course on the first day of class.

**Late Assignment Policy**
Barring extraordinary circumstances, all of your assignments should be turned in on time. **LATE READING RESPONSES ARE NOT ACCEPTED** because of the unfair advantage gained by students who turn them in after the class has discussed an article. Other late assignments will be penalized 5% of the grade for each day late. If serious illness/personal issue or a family emergency prevents you from attending class or completing an assignment on time, you must notify your professor in advance of the missed class/assignment.
THE ACADEMIC HONOR CODE: During all portions of this course, students are expected to follow the Smith College Honor Code explicitly. Some assignments will involve collaboration with other students, whereas others will be independent. You must always turn in your own work when instructed to do so. In written work, plagiarism will not be tolerated. Plagiarism includes, but is not limited to: identical wording on different students’ assignments; direct quotes from a journal article, textbook, website, or other source without a citation and quotation marks; and paraphrased text if the source of the information is not cited. You must always write in your own words. In addition, if you are not expressing your own original idea, you must cite the source of the information. Ask your professor if you are uncertain about the expectations for any assignment. For further details, please refer to the Student Handbook: http://www.smith.edu/sao/handbook/socialconduct/honorcode.php

SPECIAL ACCOMMODATIONS:
Any student requiring additional privileges in order to complete assignments during and outside of class must be registered with the Office of Disability Services and provide formal written documentation of the requested accommodations to the professor in advance of the assignment deadline. If you need such accommodations, please contact Laura Rauscher, Disability Services Director or visit http://www.smith.edu/ods/. I invite all students to come speak with me one-on-one to discuss how, together, we can best meet your learning needs.

DEADLINES:
   February 13: last day to add a course
   February 27: last day to drop a course
   April 3: last day to change grading option or use free drop (see your Class Dean)
   May 20: final grades available online