Neuroscience 145: Introductory Neuroscience

Location: Science Hall 109
Loras College
MWF 1:30-2:20

Lab:
Science Hall 252
T/TH 2:00-4:20
Spring 2019

Neuroscience Program

Instructor: Jake Kurczek, PhD
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Office Hours: By appointment

Textbook:

Class Website: You will be able to find PDFs of the lectures and discussions posted on eLearn

Course Goals and Overview

In this course, you will:
- Gain factual knowledge that includes brain anatomy, neuron function, neurotransmitters, and hormones
- Apply the course material through exploration of sheep brain anatomy
- Explore current topics in neuroscience through critical review of the primary literature
- Develop collaborative scientific skills through laboratory research projects
- Gain behavioral testing experience through laboratory experiments with live rodent subjects

Learning Outcomes

- Students will be able to identify biological/neural structures and their associated functions
- Students will demonstrate critical thinking about the role of the brain in everyday functioning
- Students will gain an understanding of the depth and breadth of the field of neuroscience
Students will enhance their ability to communicate scientific information through discussions and written assignments

Course Requirements/Policies/Assignment Details
**See ASSIGNMENT DETAILS and COURSE INFORMATION for full documentation**

Assignments
This course is based on an interactive lecture format where students will be expected to contribute to class discussions, brainstorming sessions, and small group work. Assessment of student learning will be determined as follows (see descriptions below):

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Quizzes
Quizzes will review material from the preceding lecture(s) and should be used as a guide – both in terms of the materials that will be tested in exams, and in terms of the depth of knowledge I expect from you. The exam questions may include the following question formats: multiple-choice; fill-in-the-blank; matching; true/false; and short-answer sections.

Literature Critiques
One of the most important skills to acquire in any scientific field is the ability to think critically about a given topic. In a group, you will be able to choose a journal article from peer-reviewed sources to critique. You have the option to turn in a rough draft (two weeks prior to due date) for your critique in order to receive feedback on your work, and those drafts are due one week prior to the final deadline. In your small group, you will be expected to:

1) Read the article
2) Conduct any necessary background reading and research in order to gain a more complete understanding of the central topics of the article

3) Write up a 5-page (APA Format - 5 page content) critique of the research that includes: a) a brief summary of the article, b) a review the weaknesses of the work, and c) suggestions for how the work could be improved based on your background reading. Alternatively, if there are no suggestions for improvement, describe a follow-up study to the one described in the article. Critiques will be graded on the group’s ability to:
   1) Identify and describe the main findings of the work
   2) Identify and describe the weaknesses of the work
   3) Demonstrate expertise in the area of research by suggesting ways to improve the work
   4) Write effectively and concisely
   5) Cite additional references to support your arguments

Neuroanatomy Practical
Laboratory exercises during the first half of the semester will involve extensive dissections of sheep brains. Sheep brains are excellent tools for learning human neuroanatomy because they are very similar in structure to human brains (with the exception of being about half the size). Dissections will be conducted in small groups, and all group members are expected to participate. It is highly recommended that you “study” while in these laboratory sessions. That is, don’t try to cram the night before the practical. Use the time that you have in lab, with the actual brains to review, rather than trying to study from pictures and other resources. Students (i.e. not groups) will be expected to identify neuroanatomical structures and functions that will be labeled in dissected sheep brains.

Digital Storytelling
As a class, we will create a web-based resource for students and adults to learn about how psychology interfaces with life. My thinking is that this resource will help understand the applications and misapplications of psychology to our lives. Others who are eager to learn about psychology and science should have access to this material for teaching and learning alike. Thus, your objective is to find a topic along the lines of, “The neuroscience of ______.” I’m always impressed by the number of “neuroscience” articles that I stumble across in Forbes, e.g., “The neuroscience of leadership”. When choosing a topic, you should think something along of the lines of, “I don’t think we know enough about the brain to try to make neuro-reductive statements about this complex cognitive phenomenon.” That why for your research you are able to dive into the controversies and complexities of the topic rather than summarize things we seemingly already know. Topics must be approved first - note that almost all topics on neurodegenerative and psychiatric disorders will likely be rejected (you’re welcome to take NEU301 - Neurobiology of Disease in order to explore those topics).

Your story should include a minimum of 8 empirical research articles (that are not just summarized individually, but discusses your topic in context and how the articles interact with each other), 8 multimedia resources and be the equivalent of an about 1500 word essay
Digital Storytelling Presentation/Conversation
Neuroscience conferences typically host symposium sessions, in which researchers construct talks to present their research findings from a recent study or studies. The last few days of class will consist of an academic symposium. During the session, each student will present their digital story that they have developed over the course of the semester. This also includes a five minute presentation overview completed in powerpoint/google slides.

BAW - Digital Story Midterm
For the midterm project, I’d like you to create sharable content about your topic informed by at least 6 primary scientific sources. This assignment could most easily take the form of a Buzzfeed listicle or quiz about your topic that is submitted to Buzzfeed Science. However, it could also be a Youtube/vimeo video, a list posted to Listverse, or an infographic (uploaded to imgur). As a class, I ask that we share our content across our social networks (Facebook, Twitter, Reddit) and at the end of March we’ll check to see our class’s impact in terms of the number of shares, likes and other social interactions with our products. Submit a link or the product to moodle by 3/8. We will present these publicly during class during Brain Awareness Week.

Lab Reports
Certain laboratory sessions will involve various experiments and exercises that you will conduct within your small groups. As a group, you are expected to organize and report the findings of your experiments in a scientific manner in your laboratory journals. Each exercise should be summarized in a laboratory report, which should include:

1) A brief Introduction to the topic being investigated. This should include a study question and a set of predictions about the experiment based on the assigned reading(s) for each exercise.
2) A description of the Methodology used to test the study question.
3) A description of the Results that you found.
4) A brief Discussion of the implications of the findings of the study.

Each laboratory report is due one week following the completion of the laboratory assignment.

News Updates
Students will be asked to give 2 presentations of 2-4 minute each on topics of their choice across the semester. These presentations will give students an opportunity to summarize either a current event or research finding and discuss how it relates to neuroscience. Presentations are due 2 days before the news update so that I can put it in my presentation for your news update.

Engagement
Neuroscience
Introductory Neuroscience, Spring 2019

In-Class Participation/Activities/Discussion/Critical Thinking Journal
Contribution to the Loras Intellectual Community (Out of class engagement)

Debate
We will also engage in two debates near the end of the semester (Education and Law). The neuro prefix is becoming more and more popular to the point that almost everything can be enhanced or viewed through neuroscience. However, are we truly able to take research and insight from neuroscience and apply it in real world contexts? In each debate we will look at an area where there are attempts to insert neuroscience and I will ask you to sign up to take a leading role in 1 of the 2 debates. You may sign up to argue for either the affirmative (yes, neuroscience is good and here’s what we know and how to apply it) or the negative (no, neuroscience is not good here, what we know is flawed and incomplete and we cannot apply it yet). There will be approximately a few available slots for each of the positions on each of the debate days. The rest of the class will serve as judges. I’ll ask that each person arguing the affirmative and negative for the day that they’re signed up for find an article. Each group will choose 5 students to each give a 2-3 minute summary/argument. I have created google documents that I will share with your respective groups so that each person can have a unique article. During each debate, we will switch back and forth between the 5 affirmative and negative position summary/arguments. After those presentations, teams will have 10 minutes to formulate a rebuttal and then each side will be allowed 5 minutes to voice their rebuttal to the judges. Then we will open the forum to questions from the judges before spending the last few minutes seeing where we fall on the issue.

Reflection Paper
Students are asked to write up to a 3 page, double-spaced reflection paper. This will occur on the last day of class.

Schedule*

Important Dates
1/28 – First day of classes
2/1 - Last day to add
3/8 - Registration for Summer Term
3/29 - Last day to drop with a semester course with W
4/8 - 4/12 - Registration for Fall Term
4/15 - 4/22 - Spring Break
5/10 – Last Day of Class
5/13 -5/16 – Final Exams

Check out the Course Checklist for both lecture and lab schedule.

*Tentative schedule subject to change without notice as instructor deems necessary