

# BIO/PSY 350: Foundations of Neuroscience 1

## **Instructors**

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## **Class:**

Tuesday & Thursday 11:30 -12:45 AM  
Room # 210 E

## **Lab:**

Tuesday: Dr. Dutton 2:00 – 5:00 PM  
Room #

209

## **Required Text and Materials:**

1. Neuroscience. Purves et.al. 6<sup>th</sup> edition. Oxford University Press
2. Neuroscience Basics. Larimore. 1<sup>st</sup> Edition. Academic Press
3. A Handbook of Biological Investigation. Ambrose, Ambrose, Emlen and Bright. 7<sup>th</sup> Edition

## **Course Description:**

This course examines foundational principles in cellular neuroscience. This includes the electrophysiological nature of neuronal cells, their structure and function, and the various extracellular and intracellular messages used to communicate in the nervous system.

## **Course Objectives:**

Upon successful completion of this course, the student will achieve the following objectives:

- Demonstrate knowledge of the structure and function of the different types of cells in the nervous system
- Demonstrate understanding of the electrophysiological nature of neurons.
- Design an experiment, analyze the results, draw conclusions, and report on the research both with scientific writing and an oral presentation.
- Critically read and evaluate primary scientific literature.
- Utilize effective teamwork to problem solve in an inquiry-based research laboratory project.

## **General Course information:**

**Technology:** Cell phones should be in the silence mode prior to entering the classroom or lab. No laptops, cell phones, or tablets are allowed in use during class time. You will be asked to leave class or lab if you are using your cell phone or laptop. Exceptions will be approved by the professor with at least 24-hour notice.

**Academic Honesty:** You are responsible. Scientists must conduct themselves with the utmost integrity at all times. By placing your name on ANY assignment, you are stating that you completed that assignment with academic honesty. Violations of the honor code result in outcomes ranging from failure of the assignment, failure of the course, to expulsion from the college. You should speak with your professors if you need clarification about any of these policies.

You are expected to read the article and complete the assignment (see schedule for due date): Knowing and Avoiding Plagiarism During Scientific Writing by P Mohan Kumar, N Swapna Priya,1 SVVS Musalaiah, and M Nagasree. Ann Med Health Sci Res. 2014 Sep-Oct; 4(Suppl 3): S193–S198.

You will be asked to sign a contract to remain on file through your time at Agnes Scott stating you understand the importance of academic honesty, what does and does not constitute plagiarism and your understanding of plagiarism and use of sources, and that as part of the Honor Code of Agnes Scott College and your commitment to excellence in science, you will complete all work for this class with the utmost integrity.

Academic dishonesty is reported to medical schools and graduate schools per their request. Anyone who engages in dishonest conduct relinquishes the privilege of asking for a letter of recommendation from the professor and will receive a 0 on the assignment. Any act of academic dishonesty will be turned over to Honor Court.

**Plagiarism:** do attribute all ideas taken from other sources; this shows respect for other scholars. Plagiarism can include portraying another's work or ideas as your own, buying a paper online and turning it in as if it were your own work, or not citing or improperly citing references on a reference page or within the text of a paper. Passing off someone else's work as your own represents intellectual fraud and violates the core values of our academic community. Plagiarism is passing off any work that is not yours as your own work **\*\* EVEN WITH A CITATION\*\*\***. If you are using a source and citing the source, the information from that source **STILL** must be reworded in your own voice. Putting a citation behind a statement gives ownership to that source, but, if you do not reword that information, it is plagiarism. Do not cut and paste from the slide, your book, your neighbor, Wikipedia, or the internet. To further your science education, you need to be able re-word science in your own voice. If your answers are not your own, you will receive a 0 for the assignment. All cases of academic dishonesty will be turned into Honor Court.

**Intellectual Fraud:** do not falsify or create data and resources or alter a graded work without the prior consent of your professor. This includes making up a reference for a works cited page or making up statistics or facts for academic work.

**Cheating:** do not allow another party to do your work, exam, or submit the same or similar work in more than one course without permission from the course instructors. Cheating also includes taking an exam for another person, looking on another person's exam for answers, using exams from previous classes without permission, or bringing and using unauthorized notes or resources (i.e., electronic, written, or otherwise) during an exam. Cheating also includes when you help another student complete a take home exam, give answers to an exam, talk about an exam with a student who has not taken it, or collaborate with others on work that is supposed to be completed independently.

**Course Communication:** Instructors will make announcements regularly via email. *It is your responsibility to check your Agnes Scott email account daily.* When responding to a professor over email, take care that your email is professional. \_\_\_Examples here: <https://medium.com/@lportwoodstacer/how-to-email-your-professor-without-being-annoying-af-cf64ae0e4087#.jlidd3bxes>

**Course Evaluations:** At the end of the semester you will receive an email asking you to submit an evaluation of the course. Please give feedback! Your input is important to the college as a whole and to us as instructors.

**ADA:** If you have a disability that may have some impact on your work in this class and for which you may require accommodations, please contact the Office of Academic Advising (404-471-6150) to register for services. Students that receive accommodation checklists, please meet with me to discuss the provisions of those accommodations as soon as possible.

**Title IX:** For the safety of the entire community, any incidence of or information about sexual misconduct must be reported immediately to Title IX Coordinator Karen Gilbert (kgilbert@agnesscott.edu, 404-471-6435) or Deputy Title IX Coordinator Karen Goff (kgoff@agnesscott.edu, 404-471-6449).

**Inclusion:** This course adheres to the principles of diversity and inclusion integral to the Agnes Scott community. We respect people from all backgrounds and recognize the differences among our students, including racial and ethnic identities, religious practices, and gender expressions. We strive for our campus to be a safe space in which all students feel acknowledged and supported. At the same time, we understand that course content, critical inquiry, and classroom dialogues give us opportunities to examine topics from a variety of perspectives. Such discourse is a defining feature of a liberal arts education, and can compel debates that challenge beliefs and positions, sometimes causing discomfort, especially around issues related to personal identities. While we uphold and preserve the tenets of academic freedom, we request and invite your thoughtful and constructive feedback on ways that we can, as a community of learners, respectfully assist and challenge one another in our individual and collective academic work.

**Content Warning:** This course will explore the human brain and behavior, which might raise issues of racism, sexism, classism, heterosexism, cissexism, ableism, and other kinds of privilege. I invite you to come see me if want more information. If you feel you will be unable to fully participate in the course requirements, set up a meeting with the course instructor to determine appropriate accommodations.

**Deadlines:** Attendance and participation will be assessed periodically to determine your engagement and commitment to this class. Students are expected to attend all class periods, except in cases of documented illness or emergency. If a missed class cannot be avoided because of illness or emergency, it is **STRONGLY** recommended that you contact the instructor **IN ADVANCE**, or within 24 hours of the class period. Should an emergency or crisis arise, such that you miss class, you must provide legitimate documentation in order for the instructor to consider allowing you to make up missed work. It is your responsibility to keep up with the class material. Thus, if you miss class, it is up to you to find out from a reliable source if you missed an assignment. It is also your responsibility to stay on top of presentation, quiz and exam deadlines. In-class assignments (such as the experimental design projects), presentations, and quizzes will

NOT be available to make up later, unless you have a documented excuse, OR you have contacted me ahead of time.

**Grading:** The final grade for this course will be based on the following:

<b>LECTURE GRADE:</b>	
Exams	100 points (50 points each x 2 tests)
Outline for Final Project	20 points
Class Final Project	100 points
Article Analysis	40 points (5 points each x 8 articles)
Article Presentations	40 points (20 points each x 2 presentations)
Directed Reading Quest.	22 points (2 points each x 11, 12 assignments with lowest grade dropped)
Experimental Designs	8 points (2 points each x 4 assignments)
Quizzes	30 points (3 points x 10, 11 quizzes with lowest grade dropped)
<b>Total Lecture:</b>	<b>360</b>
<b>LAB GRADE:</b>	
Pre-labs/lab notebook check	40 points (5 points x 8)
Lab report homework	25 points (5 points each section)
Lab report	100 points
Lab presentation	20 points
<b>Total Lab:</b>	<b>185</b>

\*Additional points or assignments may be added by the instructors

**Lectures:** Class lectures will be interactive. Therefore, reading the assigned chapters *prior* to class arrival will further your understanding of the material and will prove beneficial to your overall experience within the class. Lecture PowerPoints will be posted to Moodle a few hours prior to class.

**Directed Reading Questions (DRQs)** are part of your grade. They function as review questions for each chapter and can assist you in learning the information covered in the lecture. They highlight what the professor believes is the important information in the chapter. Each DRQ will be posted to Moodle prior to the lecture. They are due 24 hours prior to lecture. Answer these questions as you read the assigned chapters prior to lecture. Turn these questions as a word doc in for 2 points per worksheet. The lowest DRQ grade will be dropped. *These are all or nothing points. No partial credit will be given. No late work will be accepted for DRQs. No exceptions!*

**Quizzes (see schedule for tentative dates):** We will have short quizzes that are 3 questions long. This allows you to study the lectures as we go along; therefore, preventing potential cramming for the tests. The lowest quiz grade will be dropped. Quizzes cover any material that has previously been covered in class and is not necessarily only the material covered in the previous class lecture.

**Exams (see schedule for tentative dates):** There will be 2 exams during the semester. The exams will be written to assess your understanding of the information covered in class and your ability to apply and analyze the information using higher order thinking skills by answering short answer and essay questions. Your ability to design an experiment and/or critically analyzed data will also be assessed.

**Article Analysis:** A peer-reviewed article from primary literature will be assigned (see Moodle for articles). Everyone in the class will submit an article analysis to Moodle prior to student presentation day. The form is available on Moodle. Answer the questions and load the analysis to

Moodle as a word doc. *During the article presentation, if you are engaged in anything other than paying attention to the article analysis, you will receive a 0 on your article analysis. It is expected that you pay attention, engage and learn from the group presenting.*

**Experimental Design Questions:** At the end of some article presentation, we will be breaking into the assigned presentation groups. Each group will turn in an experiment at the end of class that takes the article one step further, with a hypothesis, model system, control variables and experimental variables clearly defined. *If you did not pay attention during the article presentation, you will not be allowed to participate and earn the points for the experimental design question.*

**Article Presentations:** The group preparing the article presentation will need to create a PPT, keynote, or Google Slides with the following information (no Prezi):

**Introduction section** – Provide background information to help our class understand your topic. *Why is this experiment important? What background information will help us understand what was done (reference the papers cited in the introduction)?* Be sure to clearly state the hypothesis and/or experimental question of the article.

**Results** – Each piece of the results (data) presented must cover the 3 points below or points will be taken off. Any time you present a piece of data, always explain (1) what the audience is looking at, (2) what method you used (if the method is new to the class, explain it in a clear way, potentially using videos or graphics), and (3) what the data mean (your interpretation) and why they are important. Be sure to include a figure legend and a descriptive figure title for each.

**Conclusions** – Include simple statements to describe the key takeaway points from the experiments and their importance in the field of study. How did the study contribute to the hypothesis?

EACH member of the group must present at least 1 figure. If there are less results figures than there are group members, then use a figure in the introduction from one of the sources cited AND/OR look to show what research has happened since the article was published and present a figure from more current work.

**\*\* Each Group Member MUST submit a PDF of THEIR slides (NOT THE WHOLE PRESENTATION) for grading 24 hours prior to the presentation.**

ANY information on your slide is FAIR GAME for a question. If you put it on a slide, BE ABLE TO EXPLAIN IT!! We will take off points if you cannot explain something on your slide.

**Things to consider for your article presentations:** Less text is better; diagrams are always helpful; keep the background information relevant; keep all additional information relevant; if it's boring to you, it's boring to your audience. Do not make the presentation "cutesy". This is a scientific presentation to your colleagues. Keep it professional. Make sure the fonts are the same on all slides, as well as all bullets. Formatting should be cohesive and look like 1 person made the presentation. The sharpest contrast between font and background is black and white. It makes your words more legible from the back of the room. In past years, group members have gained insight and bettered their understanding by meeting with the professor a week or two before the

presentation. Do not expect the professor to meet with you outside of office hours the week of the presentation.

A rubric with the grading criteria and breakdown of points is below and is on Moodle.

Criteria	5: Excellent	4: Good	2-3: Fair	1-2: Poor
<b>1. Organization (5)</b>	<ul style="list-style-type: none"> <li>• Clear title</li> <li>• Clearly defined sections</li> <li>• Clear flow of topics</li> <li>• Easy to follow</li> </ul>	<ul style="list-style-type: none"> <li>• Clear title</li> <li>• Sections defined</li> <li>• Generally easy to follow, though may require rereading for clarity</li> </ul>	<ul style="list-style-type: none"> <li>• Title present</li> <li>• Sections unclear or inappropriate</li> <li>• Takes effort to follow thoughts and ideas</li> </ul>	<ul style="list-style-type: none"> <li>• Title unclear or absent</li> <li>• Sections unclear or absent</li> <li>• No flow of ideas</li> <li>• Cluttered, messy</li> </ul>
<b>2. Creativity (5)</b>	<ul style="list-style-type: none"> <li>• eye-catching</li> <li>• Diagrams clearly labeled</li> <li>• Good balance of text and graphs or pictures</li> <li>• Engaging use of color</li> </ul>	<ul style="list-style-type: none"> <li>• Neat</li> <li>• Some use of color</li> <li>• Diagrams present</li> <li>• Fair balance of text and graphs or pictures</li> </ul>	<ul style="list-style-type: none"> <li>• Bland</li> <li>• Little or no color</li> <li>• Diagrams absent or unclear</li> <li>• Mainly or all text</li> </ul>	<ul style="list-style-type: none"> <li>• Bland</li> <li>• Boring</li> <li>• No variety in layout</li> <li>• Diagrams absent</li> <li>• Majority is text</li> </ul>
<b>3. Science Content (5)</b>	<ul style="list-style-type: none"> <li>• contains all the necessary information to understand the project</li> <li>• Information is explained in a very understandable fashion</li> <li>• No excess information that is distracting</li> <li>• All abbreviations are defined</li> </ul>	<ul style="list-style-type: none"> <li>• contains most of the information necessary to understand the project</li> <li>• Information is explained in a pretty understandable fashion</li> <li>• The majority of the information is not distracting</li> <li>• Most abbreviations are defined</li> </ul>	<ul style="list-style-type: none"> <li>• contains some of the information necessary to understand the project</li> <li>• Information is poorly explained</li> <li>• Excess information is distracting</li> <li>• Some abbreviations are defined</li> </ul>	<ul style="list-style-type: none"> <li>• contains little to no information necessary to understand the project</li> <li>• Information is not explained</li> <li>• Excess information is distracting</li> <li>• abbreviations are not defined</li> </ul>
<b>4. Oral presentation (5)</b>	<ul style="list-style-type: none"> <li>• Well-rehearsed without long pauses</li> <li>• clear articulation</li> <li>• appropriate eye contact, voice volume</li> </ul>	<ul style="list-style-type: none"> <li>• Well-rehearsed with some pauses</li> <li>• Articulation, eye contact, voice volume generally adequate</li> </ul>	<ul style="list-style-type: none"> <li>• Obvious lack of rehearsal</li> <li>• Lacking in one of areas: articulation, eye contact, voice volume</li> </ul>	<ul style="list-style-type: none"> <li>• Obvious lack of rehearsal</li> <li>• lack of conveyed information</li> <li>• lacking in one <u>ore</u> more of the following areas: articulation, eye contact, voice volume</li> </ul>

### **Class Final Project:**

For the final in this class, you will be completing a paper that integrates the information you have learned in this class, BIO 110, and BIO 111 under a Neuroscience theme. The goal of this project is to be able to make connections between the major concepts from these courses. Final papers will be uploaded to your D-portfolio to demonstrate mastery of the topics. The professors will assign the themes of this final project. If you want to switch projects, it is your responsibility to contact other members of the class and to swap topics.

#### Outline

#### Expectations:

*An outline of your project is due on \*\*October 29<sup>th</sup> before class. Outline is worth 20 points*

The outline must include the following sections:

- |                           |                         |
|---------------------------|-------------------------|
| 1. Introduction           | 6. Neurotransmitters    |
| 2. Genetics               | 7. NT release           |
| 3. Mutations              | 8. Ion Channels         |
| 4. Subcellular Organelles | 9. Current advancements |
| 5. AP                     | 10. Conclusion          |

Each of the 10 sections in the outline must contain 5 bullet points with information you are going to include in the final paper. Sections 2-8 can be rearranged in a different order if that makes more sense for your topic.

### **Final Project Expectations:**

The final project will be due before class on **\*\*November 21<sup>st</sup>**. Each of the listed topics/concepts should be covered in your paper. Knowledge of each topic should be demonstrated in your writing. Each topic should be fully explained as to how it relates to your theme. It is expected that your document will be well written and well organized. Therefore, critical attention must be given to transitions from one topic/concept to another, word choices,

grammar, formatting and spelling. Be sure to properly cite any literature used to construct your document in the formatting style for review papers in the Journal of Neuroscience. This will be submitted to Moodle as a Word Doc. You cannot use textbook or website citations, only review articles and primary literature. Word count is 2750 words - 3250 words. The word count must be on the title page. Please be sure to arrange time with the Professors and/or the CWS tutors to assist with this document

**Grading Rubric for Outline:**

<b>Section</b>	<b>0 points</b>	<b>1 point</b>	<b>2 points</b>
<b>Introduction</b>	Bullet points do not demonstrate mastery of the material and organizing necessary information	Bullet points demonstrate some mastery of the material and some organization of the necessary information	Bullet points demonstrate mastery of the material and organization of the necessary information
<b>Genetics</b>	Bullet points do not demonstrate mastery of the material and organizing necessary information	Bullet points demonstrate some mastery of the material and some organization of the necessary information	Bullet points demonstrate mastery of the material and organization of the necessary information
<b>Mutations</b>	Bullet points do not demonstrate mastery of the material and organizing necessary information	Bullet points demonstrate some mastery of the material and some organization of the necessary information	Bullet points demonstrate mastery of the material and organization of the necessary information
<b>Subcellular Organelles</b>	Bullet points do not demonstrate mastery of the material and organizing necessary information	Bullet points demonstrate some mastery of the material and some organization of the necessary information	Bullet points demonstrate mastery of the material and organization of the necessary information
<b>AP</b>	Bullet points do not demonstrate mastery of the material and organizing necessary information	Bullet points demonstrate some mastery of the material and some organization of the necessary information	Bullet points demonstrate mastery of the material and organization of the necessary information
<b>Neurotransmitters</b>	Bullet points do not demonstrate mastery of the material and organizing necessary information	Bullet points demonstrate some mastery of the material and some organization of the necessary information	Bullet points demonstrate mastery of the material and organization of the necessary information
<b>NT Release</b>	Bullet points do not demonstrate mastery of the material and organizing necessary information	Bullet points demonstrate some mastery of the material and some organization of the necessary information	Bullet points demonstrate mastery of the material and organization of the necessary information
<b>Ion Channels</b>	Bullet points do not demonstrate mastery of the material and organizing necessary information	Bullet points demonstrate some mastery of the material and some organization of the necessary information	Bullet points demonstrate mastery of the material and organization of the necessary information
<b>Current Advancements</b>	Bullet points do not demonstrate mastery of the material and organizing necessary information	Bullet points demonstrate some mastery of the material and some organization of the necessary information	Bullet points demonstrate mastery of the material and organization of the necessary information
<b>Conclusion</b>	Bullet points do not demonstrate mastery of the material and organizing necessary information	Bullet points demonstrate some mastery of the material and some organization of the necessary information	Bullet points demonstrate mastery of the material and organization of the necessary information

## Final Project Grading Rubric:

<b>Introduction</b>	Paper lacks a sufficient introduction to the topics and shows no mastery of the material.	Paper has some introduction, but not properly integrated. Some mastery of the information is evident.	Paper has most of the material for the introduction and is mostly integrated. Mastery of the material is mostly present.	Paper has an introduction that contains sufficient material that is properly integrated. Mastery of the information is evident.
	<i>0points</i>	<i>2points</i>	<i>5points</i>	<i>7points</i>
<b>Genetics</b>	Section does not contain appropriate knowledge or integration to the theme. No mastery of the subject is evident.	Section has some knowledge of the topic and some integration to the theme. Some mastery of the information is evident.	Section contains most of the knowledge for the topic and most of the integration of the them. Mastery of the material is mostly present.	Section contains necessary knowledge and integration of knowledge to the theme. Mastery of the information is evident,
	<i>0points</i>	<i>2points</i>	<i>5points</i>	<i>7points</i>
<b>Mutations</b>	Section does not contain appropriate knowledge or integration to the theme. No mastery of the subject is evident.	Section has some knowledge of the topic and some integration to the theme. Some mastery of the information is evident.	Section contains most of the knowledge for the topic and most of the integration of the them. Mastery of the material is mostly present.	Section contains necessary and integration of knowledge to the theme. Mastery of the information is evident,
	<i>0points</i>	<i>2points</i>	<i>5points</i>	<i>7points</i>
<b>Subcellular Organelles</b>	Section does not contain appropriate knowledge or integration to the theme. No mastery of the subject is evident.	Section has some knowledge of the topic and some integration to the theme. Some mastery of the information is evident.	Section contains most of the knowledge for the topic and most of the integration of the them. Mastery of the material is mostly present.	Section contains necessary knowledge and integration of knowledge to the theme. Mastery of the information is evident,
	<i>0points</i>	<i>2points</i>	<i>5points</i>	<i>7points</i>
<b>Action Potential</b>	Section does not contain appropriate knowledge or integration to the theme. No mastery of the subject is evident.	Section has some knowledge of the topic and some integration to the theme. Some mastery of the information is evident.	Section contains most of the knowledge for the topic and most of the integration of the them. Mastery of the material is mostly present.	Section contains necessary knowledge and integration of knowledge to the theme. Mastery of the information is evident,
	<i>0points</i>	<i>2points</i>	<i>5points</i>	<i>7points</i>
<b>Neurotransmitters</b>	Section does not contain appropriate	Section has some knowledge of the	Section contains most of the	Section contains necessary



	knowledge or integration to the theme. No mastery of the subject is evident.	topic and some integration to the theme. Some mastery of the information is evident.	knowledge for the topic and most of the integration of the them. Mastery of the material is mostly present.	knowledge and integration of knowledge to the theme. Mastery of the information is evident,
	<i>0points</i>	<i>2points</i>	<i>5points</i>	<i>7points</i>
<b>NT release</b>	Section does not contain appropriate knowledge or integration to the theme. No mastery of the subject is evident.	Section has some knowledge of the topic and some integration to the theme. Some mastery of the information is evident.	Section contains most of the knowledge for the topic and most of the integration of the them. Mastery of the material is mostly present.	Section contains necessary knowledge and integration of knowledge to the theme. Mastery of the information is evident,
	<i>0points</i>	<i>2points</i>	<i>5points</i>	<i>7points</i>
<b>Ion Channels</b>	Section does not contain appropriate knowledge or integration to the theme. No mastery of the subject is evident.	Section has some knowledge of the topic and some integration to the theme. Some mastery of the information is evident.	Section contains most of the knowledge for the topic and most of the integration of the them. Mastery of the material is mostly present.	Section contains necessary knowledge and integration of knowledge to the theme. Mastery of the information is evident,
	<i>0points</i>	<i>2points</i>	<i>5points</i>	<i>7points</i>
<b>Current Advancements</b>	Section does not contain appropriate knowledge or integration to the theme. No mastery of the subject is evident.	Section has some knowledge of the topic and some integration to the theme. Some mastery of the information is evident.	Section contains most of the knowledge for the topic and most of the integration of the them. Mastery of the material is mostly present.	Section contains necessary knowledge and integration of knowledge to the theme. Mastery of the information is evident,
	<i>0points</i>	<i>2points</i>	<i>5points</i>	<i>7points</i>
<b>Conclusions</b>	Paper lacks a sufficient conclusion to the topics and shows no mastery of the material.	Paper has some conclusion, but not properly integrated. Some mastery of the material is evident.	Paper has most of the conclusion necessary and it is mostly integrated. Mastery of the material is mostly present.	Paper has a conclusion that contains sufficient material that is properly integrated. Mastery of the material is evident.
	<i>0points</i>	<i>2points</i>	<i>5points</i>	<i>7points</i>
<b>Grammar/Spelling</b>	Poor Grammar and spelling.	Some Grammar and spelling errors.	Very few grammar and spelling errors	No grammar or spelling errors
	<i>0points</i>	<i>4points</i>	<i>8points</i>	<i>10points</i>
<b>Formatting</b>	Proper formatting was not followed	Proper formatting was followed most of the time	Proper formatting was followed.	
	<i>0points</i>	<i>7points</i>	<i>10points</i>	
<b>Overall Cohesion/Flow of the paper</b>	The paper was choppy and did not flow.	The paper flowed/was cohesive most of the time.	The paper was cohesive.	
	<i>0points</i>	<i>7points</i>	<i>10points</i>	

## Course Schedule\*:

\*The Professors reserve the right to change the schedule as needed

Week	Date	Class Topic	Quiz	Reading assignment	Assignment Due BEFORE Class	Instructor
1	TR 8/29	Syllabus		Syllabus	Syllabus DRQ	Both
2	T 9/3	1. Neuroscience Techniques & Evolution of Cognitive Functions		Chapter 34 in Purves et. al.	DRQ 1 and plagiarism assignment	Both
2	TR 9/5	<u>Mock Presentation/Epilepsy overview</u>	Quiz #1	<i>Staffsform &amp; Carmant</i>	Epilepsy background worksheet	
3	T 9/10	2. Anatomy of the Nervous System Part 1		Chapter 1, pages 13 – 16; Appendix A2 – A31 in Purves et. al.	DRQ 2	Dutton
3	TR 9/12	3. Anatomy of the Nervous System Part 2	Quiz #2	Chapter 1, pages 13 – 16; Appendix A2 – A31 in Purves et. al.	DRQ 3	Dutton
4	T 9/17	<u>Student Article Presentations #1</u> - Technique and Article Discussions	Quiz #3	<i>Kemmotsu et al. Epilepsy Behavior</i>	AA1	
4	TR 9/19	4. Types of Cells		Chapter 1 pages 1-10 in Purves et. al.	DRQ 4	Larimore
5	T 9/24 *	5. Cytology of a Neuron	Quiz #4	Chapter 1 pages 5-7; CH5 pages 85-88,99; CH 7 pages 160-161 in Purves et. al.	DRQ 5	Larimore
5	TR 9/26 *	<u>Student Article Presentations #2</u> - Technique and Article Discussions	Quiz #5	<i>Dutton et.al. 2013. Neurobiology of Disease</i>	AA 2	
6	T 10/1	6. Development		Chapter 22 in Purves et. al.	DRQ 6	Larimore
6	TR 10/3	<u>Student Article Presentations #3</u> - Technique and Article Discussions	Quiz #6	<i>LaSarge et. al. 2019. Experimental Neurology</i>	AA 3	
7	T 10/8	<b>TEST 1</b>				
7	TR 10/10	<b>Fall Break –No Class</b>				
8	T 10/15	7. Membrane Potential		Chapter 2 in	DRQ 7	Dutton

				Purves et. al.		
8	TR 10/17	<u>Student Article Presentations #4</u> - Technique and Article Discussion	Quiz #7	<i>Spampanato et. al. The Journal of Neuroscience</i>	AA 4	
9	T 10/22 (SfN)	Outline Day				
9	TR 10/24	8. Ion Channels		Chapter 3 in Purves et. al.	DRQ 8	Dutton
10	T 10/29	9. The Action Potential	Quiz #8	Chapter 4 in Purves et. al.	DRQ 9 & Outline	Dutton
10	TR 10/31	<u>Student Article Presentations #5</u> - Technique and Article Discussion - Design an Experiment in class activity #1	Quiz #9	<i>Yu et. al. Nature Neuroscience</i>	AA 5	
11	T 11/5	10. Transmitter Release		Chapter 5 in Purves et. al.	DRQ 10	Larimore
11	TR 11/7	11. Neurotransmitters and Second Messenger systems	Quiz #10	Chapter 6 and 7 in Purves et. al.	DRQ 11	Larimore
12	T 11/12	<u>Student Article Presentations #6</u> - Technique and Article Discussions - Design an Experiment in class activity #2	Quiz #11	<i>Volker et.al. 2017.Disease Models and Mechanisms</i>	AA 6	
12	TR 11/14 (ABRCMS)	Manuscript Review day - bring a hard copy of your rough draft to class			Hard copy of your Rough Draft the Final Project	
13	T 11/19	<u>Student Article Presentations #7</u> - Technique and Article Discussion - Design an Experiment in class activity #3		<i>Chiu et al. 2019. Neurochemistry International.</i>	AA 7	
13	TR 11/21	12. Synaptic Plasticity		Chapter 8 in Purves et. al.	DRQ 12 & Final Project Due	Dutton
14	T 11/26*	<b>TEST #2</b>				
14	TR 11/28*	<b>Thanksgiving Break- No Class</b>				
15	T 12/3	<u>Student Article Presentations #8</u> - Technique and Article Discussion - Design an Experiment in class activity #4		<i>Yang et. al. Epilepsia</i>	AA 8	
15	W 12/4	5PM – 6:30 PM: STEM Scotties Poster Night				
15	TR 12/5	CV, personal statement and hand in (in person)				

		extra credit				
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## **BIO 350 Laboratory – 1 Credit Course**

### **Course Overview:**

This laboratory is designed as inquiry- based. Therefore, students will design their experiment, carry out that experiment, analyze the data, and communicate their findings through a lab report and an oral presentation.

Students will be broken into small teams, similar to teams that are part of research labs. The first few lab classes will function to introduce our model species, the crayfish and the techniques that are available. Each group will be responsible for identifying a hypothesis that can be tested with the techniques and materials that will be used. To do this, an examination of primary literature will be necessary, so please bring a tablet or laptop to class or share with a friend throughout the duration of the course.

### **Ethical Treatment of Animals:**

As a scientist you are to respect the organism that you are studying. It is important that the crayfish are never left without food, enrichment and that their environmental conditions are adequate. Students will be assigned a schedule for care and maintenance of the animals. This includes making sure they have sufficient food, removing waste or dead animals, and turning off the lights. These factors are important as alterations can impact the quality of data generated. Failure to do so will result in an automatic 0 in the laboratory section of the course.

**Lab Notebook:** A lab notebook is a legal and official record of all things that occur in your experiment and in your workings in the lab. A lab notebook is a composition notebook with numbered pages, in which for each experimental or lab day the methods used, the observations made, and the results obtained are recorded in consecutive order. All handwritten text should be in blue or black ink and legible. If you make a mistake that's okay, simply put one line through the text and place your initials next to this omission (you should still be able to read the crossed-out text). Text is often supplemented by properly labeled diagrams, graphs, or pictures of the obtained results. If these items are printouts make sure they are attached securely to your notebook and contain references as to where to obtain and view the original file. In a research setting your lab notebook is property of the lab and likely will be used by future scientists, who may want to replicate what you have done. In this course we will randomly collect and grade your lab notebook, so ensure that your notebook is up to date, legible and provides a clear picture of your lab activities.

**Lab Report:** When a scientist writes up their results to publish in a journal, they have to follow that journal's style of manuscripts. We will practice that in this class. Your paper must follow the specifications for submission to Journal of Neuroscience for each section and for the references. Focus on the section labeled: Preparing a manuscript submission for review: <http://www.jneurosci.org/content/preparing-manuscript#organization>

Your lab report will contain the following elements:

#### **1. Abstract:** A brief summary

- A. with 2-3 sentences of background information, including the lack of knowledge in the field that this will research will address
- B. the hypothesis
- C. 1 general sentence of the methods used
- D. 1-2 sentences of the results summarized
- E. 1-2 sentences about the importance of the results

**2. Introduction:** In this section you will need to do the following:

- A. Give the background information that is necessary to understand the results section
- B. Describe what is unknown about the field of study we are exploring and why these studies are important
- C. Give your hypothesis

**3. Materials and Methods:** In this section you will need to do the following:

- A. Describe the materials used for the experiments, even if it was an experiment conducted by the instructor.
- B. Describe the methods used for the experiments, even if it was an experiment conducted by the instructor.

**4. Results (NOT JUST THE FIGURES AND FIGURE LEGENDS - IT IS MORE THAN THAT!!):** In This section you will need to address the following:

- A. Include your figures
- B. Describe the following for each figure:
  - a. In a few words, what method did you use to generate the figure?
  - b. In a sentence or 2, describe the goal of the experiment.
  - c. Describe your findings
  - d. Do these findings support your hypothesis or not?

**5. Conclusion:** In this section you will need to do the following:

- A. Recap the main findings from the experiments
- B. State if all the findings support your hypothesis
- C. Discuss how these findings impact the field of study –why are they important
- D. Suggest a natural next step from these experiments.

**Lab Report Sections:** Throughout the semester, different sections for your lab report will be due (please see schedule below for exact dates). Each section will be critiqued by your peers and the Professors. During this exercise, each section will be worth 5 points. If instructions/comments are not incorporated into the final document, points will be deducted.

These are to be submitted on Moodle as a word doc with your last name as part of the file name. Before they are turned in, setup a meeting with a tutor at the CWS. Get a slip from the CWS saying they reviewed your section, take a picture of that slip and attach it to the bottom of word doc. Failure to follow these instructions will result in loss of points.

**Laboratory Report Sections Review Rubric:**

<b>5 points</b>	<b>3.5 points</b>	<b>2 points</b>	<b>1 point</b>	<b>0 points</b>
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The section is proper length. Highly informative, complete and easy to understand. Appropriate vocabulary is used. Had a tutor from the CWS proof-read your review and you incorporated the changes.	The section is proper length. Informative, complete and understandable. Appropriate vocabulary is used. Had a tutor from the CWS proof-read your review and you incorporated the changes.	The section is proper length. Somewhat informative and understandable. Had a tutor from the CWS proof-read your review and you incorporated some of the changes.	Not very informative or understandable. Had a tutor from the CWS proof-read your review and did not make any changes.	Not very informative or understandable. Did not go to the CWS.
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### **Lab Report Final Document:**

At the end of the semester, you will write a lab report with a well-sourced introduction (8 sources at minimum), a materials and methods section, a results section explaining the data you obtained in lab (DO NOT SIMPLY PUT THE CAPTIONS FOR THE FIGURES), and a well-sourced discussion section (4 sources minimum). The majority of your references should be primary literature. You will be graded on appropriate use of scientific terminology, on construction of your report (it's overall structure), and the amount of information/appropriate information you include in your report. Follow the author guidelines for the Journal of Neuroscience to determine the structure for each of the sections of this report. Pay close attention to the order of the sections as well as the citation style.

### **Final Lab Report Grading Rubric:**

<b>Formatting -</b> JNEURO guidelines	Formatting was not followed 0 points	Formatting was somewhat followed 2.5 points	Formatting was followed 5 points		
<b>Abstract -</b> background info, knowledge gap, hypothesis and result summary	Contains no pieces of the abstract 0 points	Contains one or two pieces of the abstract. 2 points	Contains some of the pieces of the abstract 3 points	Contains most of the pieces of the abstract 4 points	contains all the pieces of the abstract 5 points
<b>Introduction -</b> Include background info, the unknown, and the hypothesis	does not contain pieces of the intro section 0 points	contains only 1-2 pieces of the intro section 5 points	contains some of the pieces of the intro section 10 points	contains most of the pieces of the intro section 15 points	contains all the pieces of the intro section 20 points
<b>Results -</b> For each data set you need 1. a well labeled figure 2. a paragraph for each figure describing the method, the findings, the goal of the experiment, and if the hypothesis is supported.	does not contain pieces of the results section 0 points	contains only 1-2 pieces of the results section 5 points	contains some of the pieces of the results section 10 points	contains most of the pieces of the results section 15 points	contains all the pieces of the results section 20 points
<b>Conclusion -</b> Recap main findings, how they tie to the hypothesis, how the findings impact the field (why they are important). and suggest next studies	little to no explanation of the pieces and not all the 5 points	pieces are missing and not well explained 5 points	some of the conclusion is clear but pieces are left out	Most pieces of the conclusion are clear and explained	all pieces of the conclusion are clear and well explained

	information is present. 0 points		10 points	15 points	20 points
<b>Materials and Methods -</b> Give the materials and methods used for ALL experiments	No methods or materials described 0 points	real or Materials out 4 points	or left Contains some of the M&M 6 points	Contains most of the pieces of the M&M 8 points	contains all the pieces of the M&M 10 points
<b>CWS Proofread?</b>	CWS reviewed the final draft 10 points		CWS did not review the final 0 points		

**Pre-labs:** When applicable, at the start of lab you will complete a short quiz regarding the assigned readings of the day. Each is worth 5 points and can not be made up.

**Lab Poster Presentation:** In addition to a written report, at the end of the semester you will have two opportunities to present your work: 1, in lab 12/3 and at the STEM Fall Research Night (12/4). An example of how to set up your poster presentation will be given in lab.

### Poster Grading Rubric:

Criteria	5: Excellent	4: Good	2-3: Fair	1-2: Poor
<b>1. Organization (5)</b>	<ul style="list-style-type: none"> <li>Clear title</li> <li>Clearly defined sections</li> <li>Clear flow of topics</li> <li>Easy to follow</li> </ul>	<ul style="list-style-type: none"> <li>Clear title</li> <li>Sections defined</li> <li>Generally easy to follow, though may require rereading for clarity</li> </ul>	<ul style="list-style-type: none"> <li>Title present</li> <li>Sections unclear or inappropriate</li> <li>Takes effort to follow thoughts and ideas</li> </ul>	<ul style="list-style-type: none"> <li>Title unclear</li> <li>Sections absent</li> <li>No flow</li> <li>Cluttered</li> </ul>
<b>2. Creativity (5)</b>	<ul style="list-style-type: none"> <li>eye-catching</li> <li>Diagrams clearly labeled</li> <li>Good balance of text and graphs or pictures</li> <li>Engaging use of color</li> </ul>	<ul style="list-style-type: none"> <li>Neat</li> <li>Some use of color</li> <li>Diagrams present</li> <li>Fair balance of text and graphs or pictures</li> </ul>	<ul style="list-style-type: none"> <li>Bland</li> <li>Little or no color</li> <li>Diagrams absent or unclear</li> <li>Mainly or all text</li> </ul>	<ul style="list-style-type: none"> <li>Bland</li> <li>Boring</li> <li>No variety</li> <li>Diagram</li> <li>Majority</li> </ul>
<b>3. Science Content (5)</b>	<ul style="list-style-type: none"> <li>contains all the necessary information to understand the project</li> <li>Information is explained in a very understandable fashion</li> <li>No excess information that is distracting</li> <li>All abbreviations are defined</li> </ul>	<ul style="list-style-type: none"> <li>contains most of the information necessary to understand the project</li> <li>Information is explained in a pretty understandable fashion</li> <li>The majority of the information is not distracting</li> <li>Most abbreviations are defined</li> </ul>	<ul style="list-style-type: none"> <li>contains some of the information necessary to understand the project</li> <li>Information is poorly explained</li> <li>Excess information is distracting</li> <li>Some abbreviations are defined</li> </ul>	<ul style="list-style-type: none"> <li>contains information to understand project</li> <li>Information is poorly explained</li> <li>Excess information is distracting</li> <li>Some abbreviations are defined</li> </ul>
<b>4. Oral presentation (5)</b>	<ul style="list-style-type: none"> <li>Well-rehearsed without long pauses</li> <li>clear articulation</li> <li>appropriate eye contact, voice volume</li> </ul>	<ul style="list-style-type: none"> <li>Well-rehearsed with some pauses</li> <li>Articulation, eye contact, voice volume generally adequate</li> </ul>	<ul style="list-style-type: none"> <li>Obvious lack of rehearsal</li> <li>Lacking in one of areas: articulation, eye contact, voice volume</li> </ul>	<ul style="list-style-type: none"> <li>Obvious rehearsal</li> <li>lack of clear information</li> <li>lacking in more of areas: articulation, eye contact, voice volume</li> </ul>





### Laboratory Course Schedule\*:

Dates	Laboratory Topic	Laboratory Task	Assignments <i>All readings should be completed prior to lab</i>
Lab 1 10/10	Introduction to Lab & Crayfish	<ul style="list-style-type: none"> <li>- Basic Care &amp; Use</li> <li>- Conduct an ethogram using a crayfish</li> <li>- Project discussion</li> </ul>	Read Chapter 2, 6, and 10 in Ambrose, et.al., Huxley TH., 1880 & Crayfish Introduction, Crayfish Anatomy & Behavior - Pre- lab 1 due
Lab 2 10/17	Introduction to Crayfish Anatomy	<ul style="list-style-type: none"> <li>- Complete a dissection</li> <li>- Project discussion</li> </ul>	- Pre- lab 2 due
Lab 3 10/24	Introduction to Electrophysiology	<ul style="list-style-type: none"> <li>- Electrophysiology recordings</li> </ul>	Read Chapter 11 in Ambrose et. al. & Electrophysiology & Cellular and Molecular Biology handouts found on Moodle - Pre- lab 3 due
Lab 4 10/31	Develop Experimental Hypothesis	Review Literature types/ citations and complete citation assignment, present problem, spend time in class working on abstract	<i>Experimental design &amp; abstract due</i> to the professor by 5PM the day AFTER lab - Pre- lab 4 due
Lab 5 10/8	Experimental design	Discuss Abstract feedback, start to discuss the lab report, & experiments	All requested materials must be submitted by October 1 <sup>st</sup> <i>Revised experimental design due</i> to the professor by end of lab - Pre- lab 5 due
Lab 6 10/15	Group Experiments	Conduct experiments	Chapter 12 and 13 in Ambrose et.al. - Pre- lab 6 due
<b>FN 10/22</b>	<b>No Lab</b> <i>Introductions are due</i> to the professor at the start of lab		
Lab 7 10/29	Group Experiments	<ul style="list-style-type: none"> <li>- Conduct experiments</li> <li>- Discuss Introductions feedback</li> </ul>	<i>Method section due</i> to the professor at the start of lab
Lab 8 11/5	Statistics & Results Group Work on Poster Presentations	<ul style="list-style-type: none"> <li>- Conduct experiments (Last day)</li> <li>- Discuss Methods feedback</li> </ul>	<i>Results section due</i> to the professor at the start of lab - Pre- lab 7 due
Lab 9 11/12	Group Work on Poster Presentations	<ul style="list-style-type: none"> <li>- Discuss Results feedback</li> <li>- Group work on Final Poster Presentation &amp; Paper</li> </ul>	<i>Discussion section due</i> to the professor at the start of lab. Poster presentation draft due at the END of lab
Lab 10 11/19	Group Work on Poster Presentations/ Curriculum vitae		
Lab 11 12/3	<b>Presentations</b>		CV due at the end of lab - Pre- lab 8 due
12/4	<b>STEM Scotties Poster Night</b>		

\*These dates/plans are tentative.