Welcome to the Neurobiology laboratory course! We hope that you will find this course interesting and challenging. Our goal is to provide you with an extensive hands-on experience with neurophysiology, that will illuminate the marvelous complexity of the nervous system. We also hope to reinforce what you have already learned about scientific methodology and communication.

Pre-requisites: BSCI355 or NEUR306, and PHYS132 or higher equivalent.

Lecture:
Friday 10-11:50pm     ESJ 1215
Bring at least one laptop per lab group.

Lab Sections:
All lab sections take place in BPS 0257
0101 Tuesday 2-6pm
0102 Wednesday 1-5pm
0103 Thursday 2-6pm

Dr. Bierman’s Office Hours:
Zoom only office hours:
Tuesdays 9:30am – 10:30am (no office hours: 9/27,10/11, 10/18)
Available in-person and virtually:
Wednesday 12pm – 1pm

Generally Dr. Bierman will attempt to be available outside of the lecture hall 30 minutes prior or after lecture for very quick questions.

Office: BPS2229
Zoom: https://umd.zoom.us/j/7170657239?pwd=c21vZVdCS2xKTFONWhsM0Y1cjNBQT09
Meeting ID: 717 065 7239
Password: NEUR

Teaching Assistants:
Juliana Sherchan     jsherchan09@gmail.com
Noah Absolon       npabsalon@gmail.com

Edited by HSB 8/22/22
Course Learning Objectives:
1. Students should be able to design and carry-out a neurophysiological experiment. This will include hypothesis generation, proper use of controls, use of appropriate techniques, prediction of results, data analysis, data interpretation, and hypothesis evaluation.

2. Students should demonstrate proficiency in the neurophysiological techniques used in the lab, including intra- and extra-cellular recordings and troubleshooting techniques.

3. Students should be able to use modeling to demonstrate an understanding of simple circuits and make hypotheses from these models.

4. Students should show proficiency in scientific writing and presentation skills, including formatting of report sections, graph selection and formatting, and incorporation of scientific literature into their lab reports.

5. Students should be able to work collaboratively on designing, carrying out, and presenting science.

Course Structure:
During the course we will move through a series of six modules. Modules should be accessed by looking under “modules” on the canvas page. Each of the first five modules consist of pre-lecture reading, a pre-lab quiz, in-lab documents, a module worksheet, post-lab assignment, and a participation survey. The final module is an independent project, which follows a slightly modified pattern.

Completion of the pre-lecture reading will better allow you to take part in lecture discussions and complete in-lecture work (which will become part of your post-lab assignments). Additionally, during the course of the semester, three pop quizzes will be given during lecture. Pop-quizzes will be open note timed assessments. These pop-quizzes will be used to assess reading comprehension and retainment of previous lecture knowledge. Pop-quizzes will be eight points each, one make-up will be provided.

Lecture periods will include some traditional lecture, small-group work activities, and workshopping opportunities. A large portion of lecture time will be spent working on simulations and modeling related to the wet lab experience.

Each module includes a Module Worksheet. Learning how to appropriately use a lab notebook is an important skill for an experimental scientist. Your lab notebook is your record of what you did during lab and lecture group work. Each lab group will keep a shared lab notebook as a google document. At the start of the semester, once groups are assigned, you will be asked to
set up a shared google drive folder. This folder must be accessible by all members of your group and your TA, and Dr. Bierman (hilaryb@umd.edu). In your “notebook” you will use a formatted worksheet (module worksheet) to describe what you are doing during each lab period and provide results. **YOUR TA WILL VIEW YOUR NOTEBOOK WEEKLY AT A PREDETERMINED TIME.** Points will be deducted if adequate progress and notation is not present in a timely fashion. You may use the notebook for group discussion and include more. **Note: Notebook entries are NOT a substitution for your post-lab assignment, but you will find them to be a great help in preparing your report. Post-lab assignments must be uploaded on Canvas.**

Before coming to the lab, each student is responsible for completing a **pre-lab reading and online quiz.** The purpose of the **Pre-Lab** is to prepare you for that week’s in-lab activity and/or to provide information to better complete the post-lab report. **Quizzes are to be completed before attending the lab.** You may meet with your group to work on the quiz, but each person submits their own.

The **In-Lab** documents consist of links to protocols and any other related information. During the lab period you will work with your assigned lab group to follow the lab protocol and complete an **In-lab portion of the Module Worksheet** (or during project weeks, a Progress Report). This worksheet functions as a lab notebook and should be completed during your lab period. Worksheets are completed as a group. Completing the worksheet will prepare you for your post-lab assignment.

The **Post-Lab assignments** are to be completed as a group. Each post lab assignment consists of a formal results section based on your collected data and answering questions that force you to reflect on your experiment. Post-lab assignments will encompass wet-lab work done during the lab period, and modeling or simulation work done in connection with the lecture period.

The **participation survey** is your opportunity to communicate with your TA and instructor about how things are going in your lab group. See **Group Work and Participation Evaluation** below for more details.

The final module of the course is the **Independent Project.** This is a summative assessment. We will discuss this through the course, but you (with your lab group) will utilize the skills learned in the earlier parts of the course to design an experiment, collect and analyze data, and present both written and oral reports of your findings. **Projects will have wet-lab, literature research, and modeling/simulations components.** During the lecture period students will do informal mini-presentations to workshop and gain assistance on their projects.

**Group Work and Participation Evaluation:**
The majority of the assignments in this course are to be submitted by lab groups (not individually). As much of research science and medicine relies on teamwork it behooves you to develop/hone good team work skills. Though reports are turned in as a group, grades are
assigned individually. Your performance on the exercises and the production of the assignments will be assessed by your fellow group-mates, the TA, and Dr. Bierman, all who are paying attention to who is participating. For each module, individual group members will provide the TA with an assessment of the other group members, based on 100%. For example, if the consensus is that one group member only did about 80% of his or her role, then that person's individual grade will be \((0.80) \times (\text{the grade earned on the portfolio})\). Your TA may withhold your grade until you complete the online group participation evaluation associated with that assignment. You will earn 1pt bonus for each prompt completion of these evaluations. Please note: for a variety of reasons, the group may choose to assign a particular individual a “lighter” portion of the work. Assuming that individual does 100% of what they were asked to do, then their grade will be 100% of the report grade, regardless of the “lighter” load they were asked to complete.

<table>
<thead>
<tr>
<th>ASSIGNMENT</th>
<th>DUE DATE*</th>
<th>POINT VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Survey and Syllabus Quiz</td>
<td>Tuesday Sept. 6th @ Noon</td>
<td>6</td>
</tr>
<tr>
<td>IN LECTURE Pop Quizzes (3 x 8 pt; one make-up pop quiz will be given)</td>
<td>?</td>
<td>24</td>
</tr>
<tr>
<td>PRE LAB Quizzes (8 x 10 pts each)</td>
<td>Start of lab period most weeks</td>
<td>80</td>
</tr>
<tr>
<td>Module Worksheets (10 pts each)</td>
<td>End of lab period for each module (1-5)</td>
<td>50</td>
</tr>
</tbody>
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**POST LAB Assignments:** (Due dates are the start of your lab period the week listed.)

- Passive Properties and Propagation Wk of 9/26 85
- Crayfish Motor Nerve 3 Wk of 10/10 100
- Membrane Potential Friday 10/21 @10am 80
- Crayfish Muscle Receptor Organ Wk of 10/25 100
- Sensory Mapping in the Cricket Wk of 11/8 30

**IN LECTURE Mini Presentations**

- Mini Presentation 1: Hypothesis & Literature Wk of 10/31 5
- Mini Presentation 2: Tables and Figures 11/4 5
- Mini Presentation 3: Modeling 11/11 5
<table>
<thead>
<tr>
<th>Assignment</th>
<th>Due Date</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mini Presentation 4: Progress Report</td>
<td>11/18</td>
<td>5</td>
</tr>
<tr>
<td>Mini Presentation 5: Lighting Round Poster Presentation</td>
<td>12/9</td>
<td>5</td>
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<tr>
<td><strong>Final Project Assignments</strong></td>
<td></td>
<td></td>
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<tr>
<td>Project Proposal</td>
<td>End of lab period week of 10/31</td>
<td>45</td>
</tr>
<tr>
<td>Progress Reports (3 x 10 pts each)</td>
<td>Wks of 11/7,11/14, 11/28</td>
<td>30</td>
</tr>
<tr>
<td>Final Project Poster Presentation</td>
<td>In lab wk of 12/5</td>
<td>60</td>
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<tr>
<td>Peer Review</td>
<td>12/12</td>
<td>10</td>
</tr>
<tr>
<td>Response to Reviewers</td>
<td>12/12</td>
<td>10</td>
</tr>
<tr>
<td>Final Project Report</td>
<td>12/12</td>
<td>100</td>
</tr>
<tr>
<td><strong>Participation Surveys for Post Lab Assignments, Proposal, and Final Project. (7 x 1pt each)</strong></td>
<td>Within 24hrs of assignment due date</td>
<td>7</td>
</tr>
<tr>
<td><strong>Lab Preparedness &amp; Active Learning (3 x 5pts each)</strong></td>
<td>Posted 9/30, 10/28, and 12/2</td>
<td>15</td>
</tr>
<tr>
<td><strong>FINAL “Quiz” (online)</strong></td>
<td>available for 24hr encompassing the assigned final schedule</td>
<td>25</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td><strong>882 points</strong></td>
</tr>
</tbody>
</table>

*Notes on Due Dates.* Due dates will be generally held, but may be subject to change at Dr. Bierman’s discretion (usually related to animal availability). **Generally, post-lab assignments are due one week following the conclusion of the experiment.**

**Notes on Lab Preparedness & Active Learning.** Five points are accumulated over 3 or 4 lab periods. Points are earned/lost by the following. All students will earn between a maximum of 5pts per 3-4 week post period. There will be no surprises at the end of the semester! Students will lose points for the reasons listed below. Multiple infractions can lead to negative points.

- Appropriate foot-ware: Inappropriate foot-ware (non-closed toed shoes) will result in 3pt deduction per infraction and require students to wear surgical booties in the lab.
- Lab Preparedness: Students are expected to show up for the lab knowing the basics.
of the day's activity. This knowledge can be achieved through completing pre-lab the quiz and reading the lab manual. Infractions will result in 2pt deduction.

- Promptness: Students are expected to arrive at the lab at the scheduled start time. Tardiness (less than 15 minutes) will result in 2pt deduction per infraction. Unexcused tardiness grader than 15 min. may result in lab absence.
- Focus: Students are expected to spend lab time focused on performing the lab activity. The TA or instructor should not have to remind any student more than once to close social media or other course study materials, etc. Infractions will result in 2pt deduction.

**Grade Assignments:**

<table>
<thead>
<tr>
<th>Percent</th>
<th>Points</th>
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</thead>
<tbody>
<tr>
<td>A+ 98</td>
<td>864.4</td>
</tr>
<tr>
<td>A 92.5</td>
<td>815.85</td>
</tr>
<tr>
<td>A- 90</td>
<td>793.8</td>
</tr>
<tr>
<td>B+ 88</td>
<td>776.2</td>
</tr>
<tr>
<td>B 82.5</td>
<td>727.6</td>
</tr>
<tr>
<td>B- 80</td>
<td>705.6</td>
</tr>
<tr>
<td>C+ 78</td>
<td>688.0</td>
</tr>
<tr>
<td>C 72.5</td>
<td>639.5</td>
</tr>
<tr>
<td>C- 70</td>
<td>617.4</td>
</tr>
<tr>
<td>D+ 68</td>
<td>599.8</td>
</tr>
<tr>
<td>D 62.5</td>
<td>551.25</td>
</tr>
<tr>
<td>D- 60</td>
<td>529.2</td>
</tr>
</tbody>
</table>

**Course Policies:**

General Policies follow University Policy:
The most up to date details of such policy can be found here:
http://www.ugst.umd.edu/courserelatedpolicies.html

Late Assignment Policy:
Dr. Bierman and the NEUR405/BSCI455 TAs have the right to refuse any late assignment. For instance, if the key to an assignment or quiz has been posted or answers discussed, the assignment is ineligible to be turned in late. If you need to be absent on a day an assignment
or quiz is due, you should make every effort to turn in the assignment ahead of time. If this is not possible confer with Dr. Bierman ASAP. When allowed, late assignments will lose 10% of the maximal grade per day they are late. The first late date starts immediately after time which assignment should have been turned in. Any bonus assignment cannot be turned in late.

Re-grade Policy:
Any request for re-grading must be submitted to Dr. Bierman in writing in a timely fashion. Regrading may involve re-grading the entire assignment and agreement to receive the regrade score. It is suggested, but not required, that you come to office hours to discuss regrade requests before submitting them. Written requests for re-grades must include details of points lost and rationale for why they should be reinstated.

Attendance Policies:
Attendance in the lecture and lab is mandatory. Failure to do so has significant ramifications to your grades, and ultimately to your success in the course.

With regard to LAB:
- **You must be on time and prepared for the lab.** Arriving more than 15 minutes late to the lab counts as missing the lab.
- **You may miss one lab session for any reason, but you will be penalized (see below).** Any student missing more than one lab without a valid, documented excuse will automatically fail the course.
- **Even with proper excused documentation there is a three lab absence maximum.** Any absence beyond 3 will result in failure.
- **Unexcused absences will be penalized** by deducting 100% of points associated with the IN LAB assignment, and 50% of the points associated with the POST LAB assignment associated with the missed lab period. Earning the 50% credit is dependent upon the student working with their group to complete the Post Lab assignment.
- **Students more than 15 minutes late may be marked absent.** Chronic tardiness will not be tolerated (and will result in loss of lab participation points). Additional time to complete assignments will not be granted to students who enter the lab late.

With regard to LECTURE:
- Attendance is mandatory and absences will negatively affect your experience and group work dynamic.
- There will be one make-up pop quiz open to anyone. Beyond that one make-up, pop-quizzes cannot be made up. For excused extenuating circumstances please discuss with Dr. Bierman.
- **Any bonus points presented during the lecture period will not be open to students missing class for an unexcused absence.**
COVID Caveats and Masking:
As I update this syllabus the COVID-19 virus has not disappeared. I am very
cognizant that Fall 2022 will not yet be truly “normal”. **Yours, the TA’s, and my family’s safety and health is of utmost importance.** Therefore:

- Do not come to the lab or lecture if you are sick.
- COVID (and Monkey pox) related absences are excused with proper documentation. **With appropriate excused absence documentation you may be permitted to attend lecture or lab via zoom.** Virtual attendance is dependent on the state of your health and the topic of the missed session, but will allow you to be an active participant within your group. This is not a long term option, and still counts as an excused lab absence.
- Please discuss with Dr. Bierman if you find that, for COVID (or other health) related reasons, you will miss more than the maximal allowed lab absences. This is an experiential learning experience and attendance is vital.
- Currently the university does not require masking in the classroom setting. **Masking in this course is strongly encouraged, especially if you may have been recently exposed.** In the lab, and during lecture, you will be close and personal with your lab group mates. I would like us to share ideas, not germs, and keep the medically weakest among us safe. **KN95/N95 masks will be available in both lab and lecture in case that you forget or need an extra.** I encourage you to discuss with your lab group mates if you have strong feelings about them wearing masks. Please be respectful of each other and wear a mask if requested by your groupmates. Feel free to come discuss related issues with me.
- If you test positive for COVID, I highly encourage you to share that information with your lab group members and TA.
- The University COVID response can be followed on: https://umd.edu/4Maryland

**How do I get an absence recognized as excused, and how do I make up the work?**
To get your absences classified as an excused absence you must complete an online absence form in a timely and complete manner. A link to the form can be found on the course canvas homepage.

Getting your absence recognized as excused allows you to complete a make-up. On the form you can select to do this by either attending another section (preferred option) or completing a written make-up assignment. Upon selection, a make-up assignment will be sent to you by Dr. Bierman. If a make-up assignment is given it must be completed adequately and in a timely fashion. If the assignment is late or incomplete, points will be deducted from your in-lab assignment. Unless otherwise specified, the make-up assignment “makes-up” for time in the lab and the In-Lab
assignment. You are still required to work with your group on the Post-lab assignment.

**Made-up labs are still considered absences.**

**What can be considered an excused absence?**
The Excused Absence Policy is in accordance with University policy.

[https://policies.umd.edu/assets/section-v/V-100G.pdf](https://policies.umd.edu/assets/section-v/V-100G.pdf)

[https://provost.umd.edu/guidance-for-absence](https://provost.umd.edu/guidance-for-absence)

**Absences due to illness:** For a first, single medical absence students may be excused with a self-signed note indicating the nature of the illness and the necessity of the absence. These notes will be held accountable to the honor code. More than one session missed for medical reasons requires documentation from a medical professional. When possible, students will be scheduled into alternative lab sections or given an alternate assignment. **For a medical related absence to be considered excused, Dr. Bierman (and preferably also your TA) must be notified within 24-48 hours after (or preferably before) the missed session. Exceptions to this rule require circumstances on the order of hospital admittance.**

**University pre-approved absences:** Some absences are known beforehand and meet the guidelines for University excused absences. As stated in the policy, these include “religious observance; mandatory military obligation; illness of the student or illness of an immediate family member; participation in university activities at the request of university authorities; and other compelling circumstances beyond the student’s control (e.g., death in the family, required court appearance). Absences stemming from work duties other than military obligation (e.g., unexpected changes in shift assignments) and traffic/transit problems do not typically qualify for excused absence.”

In the event that students will need to miss lab due to such events, they may be scheduled into alternate labs if their schedule permits, or given an alternate assignment. To do so, **you must submit the online form, within the first two weeks of the semester.** Note: absences are excused on the DAY of the event, and do **not** usually include travel time.

**Professional and Graduate School Interviews.** In addition to the University sanctioned excused absence justifications, absences due to professional and graduate school interviews are also eligible to be considered as excused absences for this course. I highly encourage you to avoid scheduling interviews during your lab period, yet I understand you may not have the option. For these absences you must submit the online absence form. I understand that you might not have this information by the first two weeks of class. **The make-up form for such absences must be turned in minimally one week prior to the scheduled absences.** Suitable documentation is a copy of an email from the interviewing school with date and time of interview. Note: absences are excused on the DAY of the event, and do **not** include excess travel time.

Please discuss any other special absence related circumstances with Dr. Bierman.
Excerpt from the University’s Policy on Excused Absences (underline is mine)

An excused absence is an absence for which the student has the right to receive --and the instructor has the responsibility to provide-- academic accommodation. Students are expected to take full responsibility for their own academic work and progress. Students, to progress satisfactorily, must meet all of the requirements of each course for which they are registered. Students are expected to attend classes regularly. Consistent attendance offers students the most effective opportunity to gain command of course concepts and materials. Excused absences must be requested promptly and must be supported by appropriate documentation.

Excused absences do not alter the academic requirements for the course. Students are responsible for information and material missed on the day of absence. Students are within reason entitled to receive any materials provided to the class during the absence. Students are responsible for making provision to determine what course material they have missed and for completing required exercises in a timely manner.

The full policy can be found at https://policies.umd.edu/assets/section-v/V-100G.pdf

Academic Dishonesty:
The University of Maryland, College Park has a nationally recognized Code of Academic Integrity, administered by the Student Honor Council. This Code sets standards for academic integrity at Maryland for all undergraduate and graduate students. As a student you are responsible for upholding these standards for this course. It is very important for you to be aware of the consequences of cheating, fabrication, facilitation, and plagiarism. For more information on the Code of Academic Integrity or the Student Honor Council, please visit: http://www.studenthonorcouncil.umd.edu/whatis.html

Help in NEUR405/BSCI455:
You should feel free to make use of your lab TA, who is available to guide you through the material. You may also contact Dr. Bierman for any unresolved issues pertaining to the course. You are highly encouraged to make use of Dr. Bierman’s or your TA’s office hours.

Students with Disabilities:
The course staff is committed to providing appropriate accommodation for students with recognized disabilities. If you have been evaluated by Accessibility and Disability Services (ADS) and qualify for specific services, please inform Dr. Bierman and your TA at the beginning of the semester. If you think that you may qualify for some accommodation but have not yet been evaluated, please contact ADS at 301-314-7682 to arrange a consultation.

University Closure Procedure:
Please watch the university website, https://prepare.umd.edu/severe-weather-events or call 301-405-SNOW to determine if the university has been closed for a weather related emergency. In the event of a delayed opening labs will meet on-time. Once the length of the
Closure has been estimated Dr. Bierman will post modifications to the course schedule on Canvas. Any online assignments will still be due even if university is closed. Exceptions, at the discretion of the instructor, may be made for extended and wide-ranging power outages. If the university is closed during oral presentations, then those presentations will take place during the scheduled final exam time for the course. If the university closes for snow Dr. Bierman will award one bonus point to any student who emails her a snow picture (preferably involving snow play).

If the university closes for pandemic or any other reason (Godzilla attack?) please be patient and Dr. Bierman will email you once she figures it out.

**Schedule:**
Wk 0-00: Lecture only: Syllabus, Course Set-up & Literature Searching
Wk 1-2: Module 1: Passive Membrane Properties, Intro to LabChart, and the Worm
Wk 3-4: Module 2: Crayfish Motor Nerve 3 and Pharmacology
Wk 5: Model 3: Intracellular Recordings of Membrane Potential
Wk 6: Module 4: Crayfish Stretch Receptor Recording
Wk 7: Module 5: Sensory Maps
Wk 8-11: Module 6: Independent Projects
Wk 12: Presentations
WK 13: Final Papers Due