BIPN 194 (BGGN 284) Advanced Topics in Modern Biology: Physiology and Neuroscience
Brain Systems for Spatial Navigation
Winter, 2021

BIPN 194/BGGN 284 COURSE DESCRIPTION: The purpose of this course is to learn how to read primary research literature and think critically about published scientific findings. This will be taught by exploring the most recent findings in the field of systems neuroscience, focusing on understanding the neurobiology in support of spatial navigation. Students will read and write a critical evaluation on an assigned scientific paper each week prior to attending and participating in a student-led presentation of the paper. Each student will join a small group to prepare one in class presentation during the quarter. All students will critique one another's presentations and learn to discuss and critically evaluate primary research literature.

Course readings will focus on research investigating the neural networks in the brain that underlie spatial navigation and pathfinding. How does the brain create maps of space that guide navigation in complex environments? The *2014 Nobel Prize in Physiology or Medicine* was awarded for the discovery of the brains "inner GPS" system. Students will present and discuss the primary literature describing the current state of the field and recent implications for artificial intelligence or learning and memory.

COURSE SCHEDULE: **Wednesday, 1:00 - 2:20 PM via Zoom**
BIPN 194/BGGN 284 is a Synchronous Remote Course. See the course Canvas page (Course Business Module, Course Zoom Links) for course Zoom links. Please contact me the first week of the quarter if you are an international student and synchronous course times are not practical. The schedule for class readings and presentations will be posted on CANVAS.

PREREQUISITES: Upper division knowledge of neurophysiology, cell biology, and systems neuroscience is assumed. BIPN 100 (Human Physiology) or BIPN 140 (Cellular Neurobiology) is a required prerequisite. However, BIPN 140 is strongly recommended. During this course you will wish you had more biostatistics background. This will come if you continue in science, but in the meantime we will discuss unfamiliar quantitative methods as we encounter them during the course. However, for those of you interested in becoming involved in scientific research you should be motivated to seek out such courses in the future.

INSTRUCTOR: Dr. Jill K. Leutgeb, Professor of Neurobiology
E-mail: jleutgeb@ucsd.edu, Note: please include "BIPN 194 or BGGN 284" in the subject line of e-mails concerning this class. If your e-mail requires an elaborate reply, please chat with me after class via zoom (I will remain on zoom a few minutes extra after each class for any questions), or during office hours.

OFFICE HOURS: Fridays 9:00 - 10:00 AM. See Canvas for Zoom link
Additionally, each presentation group will meet with me on either the Friday or Monday prior to the week they are presenting a paper in class. Members of the group must coordinate their schedules and then a representative should coordinate with me to find a time we can meet. Meeting during office hour is preferred. The meeting is intended to provide feedback on presentation materials and answer any questions about the paper to help in presentation preparation. The meeting will only continue if the group is prepared, i.e. they have read the materials and know what they don't know and need help understanding. Please share the group google presentation with me prior to the meeting so helpful feedback on the presentation can also be provided.

REQUIRED MATERIALS

Access to Canvas: There is a Canvas site for the course. To access this course, visit https://canvas.ucsd.edu/courses. You can also use http://coursefinder.ucsd.edu, which will take you to all of your courses on Canvas. If you need any technical assistance with Canvas please send an email to servicedesk@ucsd.edu. Student accounts are added on the first day of class. Instruction on how to access your account for logging on to UCSD's Canvas sites can be found here: http://acms.ucsd.edu/students/accounts-and-passwords/index.html. Concurrent enrollment (extension) students are not added automatically. More information for extension students can be found here: https://extension.ucsd.edu/student-resources/

Please check the Canvas site often. The **syllabus, course reading schedule, presentation schedule, announcements, updates, and course grades** will be communicated on the CANVAS course website. You will also turn in your weekly writing assignments and presentation evaluations using CANVAS.

Computer or tablet and internet connection: BIPN 194/BGGN 284, like many UCSD classes this quarter, will be taught entirely online. In order to participate in your UCSD classes this quarter you will need a computer or tablet and a stable internet connection. It is difficult to get by using a smart phone as some course content may not work via the phone. **You will be accessing and acquiring the research articles yourself using official government data banks or journal webpages accessible using the internet.**

If you don't have a computer/tablet at home and are concerned about affording one, email vcsa@ucsd.edu to ask if they can help.

Please make sure that you check out this website for resources on how to best learn remotely: https://digitallearning.ucsd.edu/learners/learning-remote.html

HOW THIS COURSE WILL BE ORGANIZED THIS QUARTER

Course Format: The first lecture will be instructor taught. All other course meetings will be student-led discussions of primary research literature. All meetings will be very interactive, with all students expected to participate in discussions and presentation. **Expect to spend at least three hours/week on the assigned reading and summary preparation, and 10+ hours the week you are presenting a paper.**

Course Materials: PDFs of the required reading can be found by searching PubMed, a free database of references and publications of the life sciences and biomedical research, offered by the United States National Library of Medicine at NIH (National Institutes of Health).
https://www.ncbi.nlm.nih.gov/pubmed/
PDFs will also be provided on the course website if they are not free to download on PubMed. The UCSD library has subscriptions to most major life sciences journals. Be sure to be logged into the UCSD server while searching PubMed in order to have access to all journal subscriptions. In addition, PDFs of other supportive papers will be provided to give additional background on concepts covered in the required reading. These are often review articles that can be dense, but broader in content. These papers will be provided in PDF form on the course website. There is no course textbook, but textbooks from other courses may help with general background.

Evaluation and Grading: There is no final exam. Your grade will be determined by:
1) Your attendance and participation in class. This includes completing the evaluation rubric at the end of each presentation that is not your own (25% of final grade)
2) Your summaries of papers presented each week except the week you present (35% of final grade)
3) Your performance during your group presentation (40% of final grade)

Assignment and Grading expectations:
1) Attendance and Participation: Attendance is mandatory. Documented medical or family emergencies will be accepted as excuses for missing the class. In this case a 2 page summary of the missed manuscript will be expected upon return to class, **presentations cannot be made up** (do not sign up for a day you know you cannot attend). The expectations for the summary will be discussed when the documented absence is reported. If you unexpectedly miss class due to interruptions in internet connection or computer failure, please notify me by e-mail as soon as possible to discuss your options. Students will be expected to participate in the discussion of assigned papers during class and to ask questions during the presentation. Your writing assignment requests that you prepare two questions you have after reading the paper. These questions are good material for you to use in class if asking questions on the fly does not come natural to you. **If students are not participating on their own, the instructor will randomly call on individuals to respond to questions and comments.**

At the end of each class, all non-presenters will turn in an evaluation of the presentation. A rubric will be provided on CANVAS and should be completed during or after class. Evaluations will not be accepted after the due date.

2) Weekly assignments and evaluations: You are required to read the assigned paper and write a one page, single spaced document on the assigned paper, except on the day you are presenting. These **summaries are due before the beginning of class and are to be submitted using CANVAS. Late papers will not be accepted, nor will papers be accepted by e-mail**. CANVAS 'Turnitin' requires files in the doc or docx file format. For your summary I am looking for the following information:
      1. What is the general question being asked?
      2. Why is this question important?
      3. What is the specific hypothesis?
      4. What are the strengths and weaknesses of the methodology used to test the hypothesis?
      5. What conclusions did the authors arrive at from their experiments (be sure to also state the experiment and refer to specific Figures when appropriate)?
      6. Did their results address their question?
      7. Do they prove or disprove their hypothesis?
      8. What part of the paper did you find the most convincing or confusing? Why? What is the weakness of the paper?
      9. What are the implications for these findings in the field of spatial navigation?
      10. What are two questions you have about the paper?

3) Presentations: Groups will be determined on the first day of class. Each group will have 40 minutes for the presentation and 15-20 minutes for questions and discussion. Each group member will have equal presentation time and should be prepared to answer questions and engage the class in discussions. It is the expectation that each group will clearly present the question/concept being tested in the paper, the approach by which the question was tested, and the significance of the paper. You will need to look up any background or terminology that you are not familiar with so that you can explain it

to the class. A rubric will be used to evaluate your presentation. The rubric is available on CANVAS in order for you to see beforehand how you will be assessed.

Group meetings for the presentation. Each group of presenters needs to exchange contact information (phone numbers and e-mail information) and arrange meetings to discuss the overall presentation and how the sections of the paper will be divided amongst the group members. These meetings are essential. I will also meet with the entire group on Friday/Monday before the presentation to discuss the presentation and help with any questions. This is a mandatory meeting that will help with your presentation. Each group member should be prepared for this meeting and have read the paper and prepared 4-5 slides. After our meeting, the group may wish to meet again to tweak or edit the presentation.

The group's entire presentation needs to be on one computer in one file or compiled as a shared google presentation (i.e., powerpoint, keynote, google, or a format agreed upon by the entire group) and the presentation needs to be backed up on a memory drive. One designated person will share the presentation as a Zoom co-host. The Zoom link will allow all group members to annotate the shared presentation. **The presenting group must join the class Zoom link 10 minutes early to set up.**

Background/Introduction: In this part of the presentation you need to describe the biological question that the authors were asking. You will need to provide the necessary background for the paper so that your audience can understand the importance of the author's question.

Results: Here you need to logically present the experimental results. How did the authors address their question? Explain the tools and methodology that the authors use to address the hypothesis. What are the specific conclusions from their results? I recommend that each group member presents one or two figures each. Most figures in papers have multiple panels. Many papers have supplementary figures that support the main figure and these are required reading for the paper. You will need to decide which of the supplemental figures should be presented and are vital to the conclusions of the paper. For each figure you should explain what is being tested and why. Most figures have one or two main conclusions, be sure you are clear about these and can explain these to the class. Experiments require proper controls, also make sure you understand why the given controls were used and if they are appropriate. Discuss reservations and criticisms about the data, if any.

Conclusions and implications: Overall what are the findings of this paper? Does the data support the conclusions? What are the next steps that follow from these experiments? How do the data impact the field?

Nonpresenters: You are expected to read every paper before coming to class and be prepared to discuss and ask questions. **During class you are expected to turn on your video feed and participate in discussion and ask questions**. The instructor will pick on individuals randomly to answer questions if the class is not participating naturally, or an individual has not commented. At the end of each class you will fill out your evaluation rubric and turn it in on CANVAS. Note, these evaluations need to be constructive, and are an important part of your participation grade and will be shared with the presenters for feedback.

Your final grade is based upon the following (as described in the course syllabus):
1)   Attendance/participation/rubric = 25%
2)   Weekly written summaries = 35%
3)   Presentation = 40%

To determine your overall grade, please use the following formula:
Total percentage = [(% participation) x 0.25] + [(% written summaries) x 0.35] + [(% Presentation) x 0.40]

Grading Scale: (based on total course percentage, scores rounded to the nearest whole number)
A+   98% to 100%
A   93% to <98%
A-   90% to <93%
B+   86% to <90%
B   83% to <86%
B-   80% to <83%
C+   76% to < 80%
C   73% to <76%
C-   70% to <73% (everything above this line is considered passing if grading P, NP)
D   <70% to 60% (there is no D+ or D-)
F   < 60%

STUDENTS WITH SPECIAL CIRCUMSTANCES: UCSD is committed to education for all people. Services and reasonable accommodations are available to students with temporary and permanent disabilities, to students with DACA or undocumented status, to students facing mental health issues, other personal situations, and to students with other kinds of learning needs. Please feel free to let the instructor know if there are circumstances affecting your ability to participate in class. Some resources that might be of use include:
- o   Office for Student with Disability, https://students.ucsd.edu/well-being/disability-services/index.html
- o   UC San Diego CAPS (Counseling & Psychological Services), https://wellness.ucsd.edu/CAPS/Pages/default.aspx
- o   UC San Diego Undocumented Student Services, https://uss.ucsd.edu/ Note: a list of campus resources can be found here: https://students.ucsd.edu/sponsor/undoc/resources/index.html
- o   Learning Strategies Center, https://commons.ucsd.edu/academic-support/learning-strategies/index.html

Students requesting accommodations and services due to a disability for this course need to provide a current Authorization for Accommodation (AFA) letter issued by the Office for Students with Disabilities (OSD), prior to eligibility for requests. Receipt of AFAs in advance is necessary for appropriate planning for the provision of reasonable accommodations. OSD Academic Liaisons also need to receive current AFAs. For more information, contact the OSD at (858) 534.4382 (V); (858) 534-9709 (TTY); osd@ucsd.edu, or http://osd.ucsd.edu. You will need to coordinate any special scheduling for the presentation with the instructor. All of these arrangements should be made within the first two weeks of the quarter.

ACADEMIC INTEGRITY: Academic dishonesty will not be tolerated. According to UCSD policy, academic dishonesty includes:

- Completing assignments for another student or allowing another student to complete an assignment for you.
- Copying another student's work or allowing another student to copy your work.
- **Incorporating plagiarized material into assignments.**
- Faking a family emergency or medical condition

All suspicions of academic misconduct will be reported to the Academic Integrity Office according to university policy. The Policy on Integrity of Scholarship (academicintegrity.ucsd.edu) and this syllabus list some of the standards by which you are expected to complete your academic work, but your good ethical judgment (or asking for advice) is also expected as we cannot list every behavior that is unethical or not in the spirit of academic integrity.

Those students found to have committed academic misconduct will face administrative sanctions imposed by their college Dean of Student Affairs and academic sanctions imposed by the instructor. The standard administrative sanctions include: the creation of a disciplinary record (which will be checked by graduate and professional schools); disciplinary probation; and attendance at an Academic Integrity Seminar (at a cost of $75). Students can also face suspension and dismissal from the University; those sanctions are not at the instructors' discretion. Note: the Instructors sanctions state that students will receive a final grade of 'F' if academic dishonestly is confirmed in addition to other disciplinary actions deemed appropriate by the Academic Integrity Office. Students who assist in or are complicit with cheating could also be in violation of the Policy. Thus, students who become aware of their peers either facilitating academic misconduct or committing it should report their suspicions to an instructor for investigation.

See: http://weber.ucsd.edu/~dkjordan/resources/cheat.html for additional information.