**Course Description:**The goal of this course is to give you a foundational understanding of systems neuroscience as well as first-hand experience in reading, analyzing, and presenting primary literature concerning systems neuroscience. The B section of this course is designed for those with an interest in the topic but whose main focus is not systems neuroscience. Each week, students will present primary research related to a current topic in systems neuroscience (articles will be assigned). As a class, you will discuss the strengths and weaknesses of the study, and provide feedback about the presentations. Class participation is very important, so attendance is mandatory. Two or more absences will result in a reduced letter grade. *Zoom options may be available in extreme circumstances.****Please be proactive about communicating any potential absences.***

**Learning Objectives:**The focus of this course is to provide a more in-depth exploration of topics covered in Systems Neuroscience (03-363), while teaching students how give scientific presentations and to distill and interpret primary literature. In particular, we will emphasize the conclusions of the assigned papers, examine the experimental basis of these conclusions, and discuss their validity. The syllabus and course objectives are updated every year to reflect the ever-changing field of systems neuroscience. The syllabus is also structured to more deeply follow the materials covered in the lecture, as much as possible.

**Lecture Component**: Basic neuroscience knowledge (neuron and nervous system anatomy and function) is strongly suggested, but not required. The systems neuroscience lecture course 03-363 on Tues/Th is **required**, as all students will take the midterm and final exams. Please use the Canvas page for 03-363, as all assignments posted there except the Neuroanatomy Project will be required.

Instructor:   
Professor: Eric Yttri (*pronounced “it-tree”*)   eyttri@andrew.cmu.edu  
Instructor: Luz Andrino landrino@andrew.cmu.edu

Office hours may be arranged by appointment.

***Class roster and emails can be found in*Files*.  
First class = virtual, please see below***

**How to succeed:**

* **Read the assigned readings *before*class.**This is imperative and is almost the whole of the course
* **Come with questions about the readings.**Your participation grade, and more importantly, what you learn, will greatly benefit if you come ready to discuss and ask questions.
* **Review/think about/talk about what was covered in class.**In addition to simply showing up for class, spend time between lectures looking over your notes and thinking about what was discussed.  You can do this alone or in groups with other students in the class.
* **Success in this course is about more than your grade.**We want you to learn to think scientifically about your brain. This will serve you well long after you stop caring about your transcript.

**Grades are as follows:**

20% Journal article presentation  
20% Wednesday class participation and attendance  
5% Weekly Summaries (via 03-763 canvas) + Reverse Quizzes (via 03-363 canvas)  
5% Seminar report (as described in 03-363)  
10% News and Views article (as described in 03-363)  
20% Midterms (as in 03-363.  no notes, no book)  
20% Final Exam (no notes, no book)

**Course Format:**

Each week, groups of students will present their assigned material for the week. In some cases, a review paper accompanies the main paper. This is meant to help the presenter lay the background; the original research should still take “center stage”. Please allow enough time for discussion  - do not plan on presenting for more than an hour. Part of good presenting skills is the ability to distill the important information.

**Weekly summaries:**Before each class session, please submit 1-2 paragraphs summarizing the research to the *Assignments* folder. In addition to the summary or as part of it, make sure to a) identify the central question to the study **in bold**(to help me find it), b) which figure and panel was the most important and why and c) whether you thought the authors succeeded in answering their central question and **WHY**.

For all readings, especially review articles or shorter studies, the presenters are responsible for providing adequate background to the class who come from diverse scientific fields. This likely will involve looking up key cited papers in the assigned document to expand your knowledge. Aim to present for ~1hr, with an additional 20 minutes for questions.

Presenters will receive the same grade for 80% of the possible points. The remaining 20% may vary from person to person across the group, but typically all students presenting receive the same grade. It is recommended that you coordinate and practice the presentation ahead of time to ensure that all of the appropriate scientific content is covered. If some of the points are unclear to you, ask your instructor ahead of time, and/or share this point in class to encourage discussion.  
The presentation with the following rubric:  
20% Clarity of slides, oral presentation  
30% Sufficient background information  
30% Comprehension/explanation of material in the paper  
10% Conclusions about the material and avenues for future work  
10% Class engagement/management

The formal rubric can be found in *Files*.

After the presentation, the whole class will discuss the week's readings, focusing on strengths, weaknesses and next steps/next applications. If you feel the presenter did exceptionally well - tell them that! If you feel the presenter could improve in certain areas, tell them that as well. Remember to be constructive- it will be your turn at some point.

**Student Support:**

All of us benefit from support during times of struggle. You are not alone. There are many helpfulresources available on campus and an important part of the college experience is learning how to ask for help.

If you or anyone you know experiences any academic stress, difficult life events, or feelings like anxiety or depression, we strongly encourage you to seek support. Counseling and Psychological Services (CaPS) is here to help: call 412-268-2922 and visit their website at

http://www.cmu.edu/counseling/. Consider reaching out to a friend, faculty or family member you trust for help getting connected to the support.

**Academic Integrity:**

* **Cheating.**Cheating of any sort will not be tolerated. For example, if quiz or exam answers are copied from another student, both students will receive zeros for the class; if graded exams or quizzes are altered and resubmitted for a higher score, the student will receive a zero for the class. In addition, these and other forms of cheating may also be referred to the Academic Review Board for more severe penalties. This warning has two purposes: 1) to dissuade a small number of students from even thinking about cheating; and 2) to persuade the large majority that they will get a fair grade based on their individual performance. Exams will be video recorded.
* **Plagiarism.**Cheating includes plagiarism, the presentation of the work of another person as one’s own. This applies whether the source of the material is a printed book, a web site, or work of another student from this course or any other course. Lifting even a single sentence without appropriate attribution constitutes plagiarism. Read Promoting Academic Integrity (http://www.cmu.edu/policies/documents/Cheating.html) for official university policy on this issue. **Any source you reference (aside from the class text book or assigned aricle) must be referenced, even if you only used the source for ideas and did not quote a single word.**   
  Any AI-mediated assistance for writing, including but not limited to. ChatGPT and Grammarly, will not be accepted. All submitted documents may be run through an online detection method. Do yourself a favor and check for yourself before submitting using zerogpt.com. There are situations wherein responsible AI-assisted writing is a useful and valuable skill - this class is not one of those situations. In the end, it is likely easier and certainly of far more benefit to you to practice your writing and synthesis by crafting your responses from scratch, rather than using an app and then try to reduce its AI signature.   
  *Any cheating or plagiarism, including the use of AI, will result in the loss of all points for the assignment plus an additional 30% deduction from the course and potential involvement of Academic Affairs.*

**TURN OFF YOUR CELL PHONE***before***JOINING CLASS!**If your phone rings during class, turn it off ASAP. Do not answer it. If it happens more than once, you will be asked to leave for the day and receive a 0.

**Please do the following for class on Jan 17 (Week 1):**

1. Watch the following video and complete exercise A, which is embedded in the video.  You can just take notes on this exercise and bring your answers to class where we will review them. [Designing Effective Slide PresentationsLinks to an external site.](https://youtu.be/kbdO7adBRFE)[A black and grey play button

   AI-generated content may be incorrect.](https://youtu.be/kbdO7adBRFE). Additionally, please watch at least the first 30 minutes of this really insightful video on science talks: [https://www.youtube.com/watch?v=nGrppCIe11oLinks to an external site.](https://www.youtube.com/watch?v=nGrppCIe11o)[A black and grey play button

   AI-generated content may be incorrect.](https://www.youtube.com/watch?v=nGrppCIe11o)
2. In place of exercise B, read the following article from the Churchland lab:[https://www.jneurosci.org/content/37/19/4954.longLinks to an external site.](https://www.jneurosci.org/content/37/19/4954.long) ,  
   and create approximately 5 slides (or however many you think you need) to explain the results in Figures 3, 4, and 7. In creating these slides, please keep the following rules in mind:  
   - All slides need titles, and all titles must be complete sentences.  
   - If the material presented on the slide does not fit with the title, it should not be included on that slide.

**For the rest of the semester, please use the following lineup ( to be updated as the class roster solidifies, which may be into Week 2). Bring any/all adapters or pointing devices you may need.**

**Week 2 - JD and Alexis  
Considerations Arising From a Complementary Learning Systems Perspective on Hippocampus and Neocortex**[https://onlinelibrary.wiley.com/doi/epdf/10.1002/%28SICI%291098-1063%281996%296%3A6%3C654%3A%3AAID-HIPO8%3E3.0.CO%3B2-G  
  
Links to an external site.](https://onlinelibrary.wiley.com/doi/epdf/10.1002/%28SICI%291098-1063%281996%296%3A6%3C654%3A%3AAID-HIPO8%3E3.0.CO%3B2-G)

**Week 3 - Bingzhe (Kevin) and Sanskruti  
Neural circuits for goal-directed navigation across species**[**https://www.cell.com/trends/neurosciences/fulltext/S0166-2236(24)00177-2**Links to an external site.](https://www.cell.com/trends/neurosciences/fulltext/S0166-2236(24)00177-2)

**Week 4 - Maxime and Kyubo  
Neural Circuits of Interoception**[https://pmc.ncbi.nlm.nih.gov/articles/pmid/33378653  
Links to an external site.](https://pmc.ncbi.nlm.nih.gov/articles/pmid/33378653)and

**Turning Touch into Perception**[https://www.cell.com/neuron/fulltext/S0896-6273(19)31042-6?\_returnURL=https%3A%2F%2Flinkinghub.elsevier.com%2Fretrieve%2Fpii%2FS0896627319310426%3Fshowall%3DtrueLinks to an external site.](https://www.cell.com/neuron/fulltext/S0896-6273(19)31042-6?_returnURL=https%3A%2F%2Flinkinghub.elsevier.com%2Fretrieve%2Fpii%2FS0896627319310426%3Fshowall%3Dtrue)

**Week 5 - EXAM.**

**Week 6 - Dinesh and Jayant  
Computation Through Neural Population Dynamics**[https://www.annualreviews.org/content/journals/10.1146/annurev-neuro-092619-094115Links to an external site.](https://www.annualreviews.org/content/journals/10.1146/annurev-neuro-092619-094115)

**Week 7 - Satanai and Joseph and Ruiming**(February 26th)

**Volitional control of neural activity: implications for brain–computer interfaces**

[**https://physoc.onlinelibrary.wiley.com/doi/10.1113/jphysiol.2006.127142**Links to an external site.](https://physoc.onlinelibrary.wiley.com/doi/10.1113/jphysiol.2006.127142)

**AND**

**--- Going beyond primary motor cortex to improve brain–computer interfaces (only 3 figures)**[**http://www.actcompthink.org/pubs/GallegoEtAl2022\_TiNS.pdf**Links to an external site.](http://www.actcompthink.org/pubs/GallegoEtAl2022_TiNS.pdf)

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**SPRING BREAK!!!**