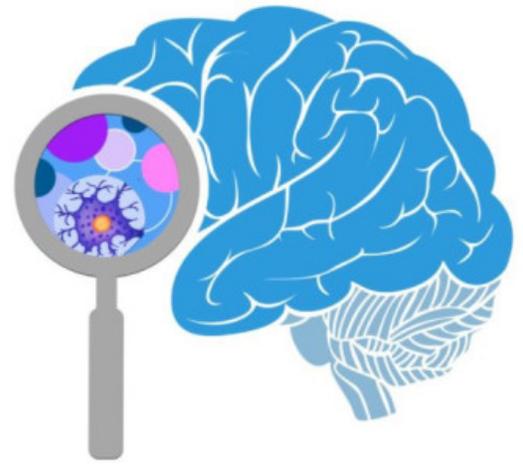


# NSCI423: Neurotechnology

*in modern Neuroscience  
Research*



Department of Psychology & Neuroscience

Section 001; MWF 10:10-11:00am; Jan 19-May 14, 2021

Section 002; MWF 11:15-12:05pm; Jan 19-May 14, 2021

**Remote Synchronous Zoom Sessions MWF**

Spring 2021 COURSE SYLLABUS Pre-requisite: NSCI175 or PSYC 101 & PSYC 220

**Instructor:**

Dr. Sabrina Robertson

[sabrinae@email.unc.edu](mailto:sabrinae@email.unc.edu)

615-830-1677

Davie Hall 230 & Wilson 237

**Office Hours:** Please use the Sakai 'Sign-up' tool to reserve a time. Monday & Wednesday 3:00-4:00pm. We will meet via zoom.

<https://unc.zoom.us/j/93881261128>

**ULA 001 Section:** Emma Milligan – please use Piazza to contact

**ULA 002 Section:** Matt Capobianco – please use Piazza to contact

This course addresses fundamental challenges inherent in studying the brain and explores the theory, applications, and limitations of new and traditional neurotechnology. The unique ethical issues and significance of interdisciplinary approaches in neuroscience will also be highlighted. Students will analyze research literature and focus on cellular, molecular and genetic techniques that are essential staples in the neuroscientist's toolkit. Students will also **design** experiments, **utilize** publicly available resources, and **analyze** big data generated by high-throughput approaches to investigate research questions.

*Contacting me with your questions: We are going to use a course Piazza site. This site allows you to send private messages to me and you can also pose general questions to the class regarding course content or logistics. I tend to hear similar questions often. By checking in at the Piazza site, and asking your questions there, I can ensure that you get a response quickly and we can have important class discussions. We should all check Piazza daily. **Using Piazza, rather than email, will ensure that you get the swiftest response and that your email does not get lost. Please do not send a regular email. I check Piazza regularly because my students and courses are my top priority!!** \*NOTE: If you need to send a private message, Piazza enables this as well just check the box to send your message to the instructor only.*

## LEARNING OBJECTIVES: *Students in this class will learn to do the following...*

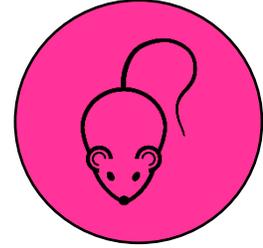
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Discuss the limitations of studying the brain in humans and the importance of model organisms



Evaluate the limitations and potential of traditional and modern neuroscience tools



Explain how the brain and animals are handled and prepared for different experimental applications



Analyze and interpret data from primary research articles that employ novel methodology



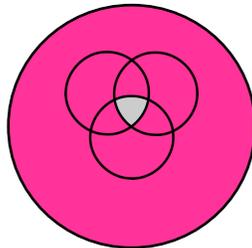
Identify traditional and emerging therapeutics used to treat neurobiological disorders



Design an experiment using cutting edge neurotechnology



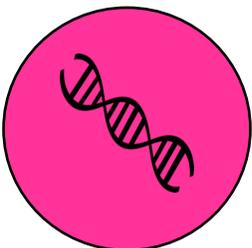
Discuss ethical issues that are unique to neuroscience research on animals and humans



Articulate the importance of interdisciplinary approaches in modern neuroscience research



Utilize publicly available platforms to access data and research tools for the investigation of an important research question



Analyze large data sets generated by high-throughput based neuroscience approaches (RNA-seq, large-scale recording and imaging techniques, etc.)

*This is an active learning class!*

**Please protect our class time in your schedule for synchronous interactions.** We are going to use class time engaging in active learning (e.g. lab analysis, discussion, etc.). Important concepts will be introduced via pre-class work (readings, quizzes, etc.). During class we will work together to explore neuroscience research and put larger conceptual ideas together. This approach is a lot more fun than sitting passively listening to me lecture! And besides, it will give us opportunities in class to work through the most challenging content. **This means we all need to come to class prepared to be active learners.** An abundance of research demonstrates the effectiveness of this method over a traditional lecture only course. While regular attendance and class participation are expected, I understand these are unprecedented and unpredictable times. [If you are impacted by the pandemic, cultural issues, etc. reach out to me. I care about you, and we will find a way to support you and your success in the course!!](#)

### We can prepare for class by following these steps...

1. Complete the assigned readings, research analysis assignments, videos, etc. *before* class.
2. Review & **practice** each lesson's learning objectives after class with your notes closed
3. Identify challenging concepts so that we can work through these concepts together.

*Please remember that we are here to make sure that you succeed in this class! If you are having trouble, please seek our support.*

### WHAT YOU SHOULD BRING TO CLASS EVERY DAY:

1. **Guided note taking student worksheets (posted on Sakai)**
2. **Extra blank paper** for drawings, notes, activities etc.
3. 3 x 5 **index cards.**
4. Your **laptop/tablet/smartphone** enabled for UNC wi-fi access.

## *How is my final grade determined?*

**15% = Pre-class work** (research analysis worksheets, concept maps, figure annotation, writing practice exam questions, etc.)

**15% = Class Engagement** (polls, student worksheet activities, tickets out the door, etc.)

**15% = Journal Club Participation**

**20% = Group Big Data Case Studies**

**15% = Group Design Presentation**

**20% = Exams**

### **Letter Grade Assignments**

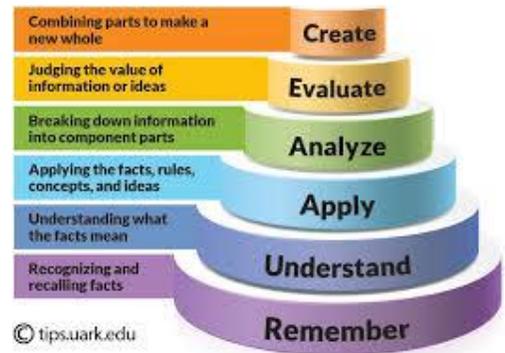
A = 94-100	C+ = 77-79	F = 0-59
A- = 90-93	C = 74-76	
B+ = 87-89	C- = 70-73	
B = 84-86	D+ = 67-69	
B- = 80-83	D = 60-66	

\* Final grades are rounded (.4 down and .5 up).  
For example, 89.4 = 89/B+; 89.5 = 90/A-

# Rationale

Rather than having your grade ride on just a few high stakes exams and/or assignments, your grade in this course will be composed of a number of components to facilitate your learning. The exams, assignments, and activities that you will complete in this class are carefully designed to optimize your learning. I use an evidence-based approach when designing classes. This means that I use learning approaches based on scientific evidence that demonstrates the effectiveness of these approaches.

Overall, you will progress through Bloom's taxonomy of learning, so you are analyzing, evaluating, and creating. Writing in class assignments, reports, analysis worksheets (10 pages) will also be key to this progression. Not only is this more fun than memorizing, but you will also be more likely to retain the information!



## ASSIGNMENT DETAILS

### Pre-class work

For many classes, you will have small written homework assignments to complete before you come to class (see Sakai). *Our course does not have a textbook since we are exploring cutting edge neurotechnology that changes constantly. We will watch videos, read papers, peruse websites etc. to prepare for class.* Many of these activities will be accompanied by

tasks to help you navigate the content before class and prepare you for active discussion in class. We may create concept maps, annotate figures, analyze data, write practice exam questions, etc. All pre-class work is due before class begins. One pedagogical tool we will use extensively are research analysis worksheets.

### Research Analysis Worksheets

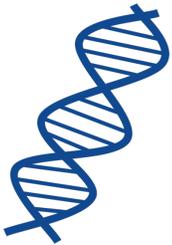
Reading research articles is tough, especially for a novice, and it requires practice and patience! I've designed these analysis worksheets to help you learn how to read research articles. They require you to focus on the data and critically analyze the results of two figures in a table panel by panel (adapted from figure FACTS). They also require written reflection to assess your understanding of the work and a lay audience abstract. A sample is provided on Sakai. *Reading articles and digesting them sufficiently to complete the worksheets takes significant time so plan ahead!* The worksheets also serve as an aid for you during journal club discussions, so be sure to print a copy for the in-class discussion.

To keep us all engaged in our class sessions, we will participate in polls (<https://poll.unc.edu>), tickets out the door, collaborative analyses, etc. Student worksheets are created for each session and will include all our class engagement activities. *Use the student worksheets before class AND during class to guide your note taking.* Our class engagement activities will largely be participation based and not graded on correctness. Its ok if we don't know the correct answer, the effort, struggle and engagement is what is most important and will ultimately advance our understanding of course content.

## Class Engagement

# Journal Club Participation

We will discuss research articles often in our course. To best dissect and understand these articles we will adopt a journal club format. We will all read the article or components of it before class. Together in class, we will split up into groups and each group will tackle a particular figure in the article for presenting back to the rest of the group. We will all need to be prepared to present our assigned figures to our larger group after discussion and to ask questions if we are confused. **These articles are tough and none of us will understand every intricate detail of the article but that is ok. We will analyze them together, focus on the big picture and have a fun discussion.** The rubric for journal club participation is posted on Sakai.



High-throughput approaches are becoming common staples in the neuroscientist's toolkit. Working collaboratively and in interdisciplinary teams will also be essential to unlocking the great mysteries of our brain. **To develop your quantitative and teamwork skills you will work with data from a high-throughput neuroscience study (RNA sequencing, microbiome sequencing, etc.) in a team of four students.** This assignment will give you some hands-on experience with BIG data analysis, collaboration and presentation of scientific data. Further details about the case studies will be discussed in class and are also available on Sakai.

## Group BIG Data Case Studies

**GROUPS for the semester:** You will be assigned to a group of 4 students that you will work with throughout the semester. **Collaborating with others is an essential professional skill especially in neuroscience. Every research paper has many contributing authors & every recommendation letter I write includes information about collaboration skills.** You are all expected to contribute to your group's success in a professional manner. I am available to help you solve interpersonal problems, should they arise. As a group, you will come up with your own code of conduct. If any member of your group violates your code of conduct, the group has the option to remove that individual from the group (e.g., submitting work late, failing to show up for work sessions, lack of communication, etc.). Changing the group structure involves a two-step process: First, the team (**in consultation with Dr. Robertson**) gives the member a written warning, and the member then has an opportunity to respond to the warning (i.e., how they will fix the problem). Second, if the member continues to act unprofessionally, they will be removed from the group. If a student is removed from their group at any point in the semester, they will complete *alternative* assignments as an individual, starting from the beginning, and incurring late penalties if applicable.



**\*Please note: all written assignments must be written in your OWN words with appropriate citations. I am required by the University to report all instances of plagiarism or suspected plagiarism. If you are not sure how to paraphrase or avoid plagiarism, check out this resource from our [writing center](#) or come chat. Also please note that quoting passages from your sources (yes, even in quotation marks) is not appropriate in neuroscience (it is in other fields!). In neuroscience, standard practice is to paraphrase and cite in text.**

## Group Design Proposal Presentation

**In place of a final exam, Students will work in their semester teams to design a research strategy and present it.** The strategy will use a cutting-edge neuroscience technique, to explore the function or projection pattern of your favorite neuronal population.

You must use your knowledge of genetic and/or viral targeting approaches to selectively isolate your cell population of interest. You will use a published research article as your foundation for developing a scientific question and your growing knowledge of neuroscience methodology to design a future research strategy to answer that question. Students will create a presentation, present their strategy, and field questions about their approach during our final exam period. While your group is not presenting, you will be expected to peer review other presentations using our rubric. We will provide feedback regarding the feasibility of their approach, limitations and strengths of their methods, and potential significance and broad impact of their research study. As a group we will select the top projects for “funding”.

## EXAMS

There will be 2 exams in total over the course of the semester. Exams will consist of multiple-choice questions. We will have exam review sessions for each exam. Every exam question will be based on a learning outcome in the course. *The best way to study is to do the class pre-work, student worksheets, engage in class and use the learning outcomes to review our class sessions EACH week.* To review our class session we recommend coming up with a scheduled time each week that you protect for this review. Make sure you’ve downloaded our PowerPoints and read the notes section. In the notes, the learning outcome addressed on the slide is identified along with notes to help understand the content. Using the student worksheets, PowerPoints and Learning outcomes create a study guide that you update each week. It is key to practice doing the learning outcomes with your notes closed on a blank sheet of paper! Use your study guide to check your answers.

### What do my grades mean?

Here is an explanation of grades from the Undergraduate Bulletin (<http://www.catalog.unc.edu/policies-procedures/attendance-grading-examination/>):

A **Mastery of course content at the highest level of attainment** that can reasonably be expected of students at a given stage of development. The A grade states clearly that the student has shown such outstanding promise in the aspect of the discipline under study that he/she may be strongly encouraged to continue.

B **Strong performance demonstrating a high level of attainment** for a student at a given stage of development. The B grade states that the student has shown solid promise in the aspect of the discipline under study.

C **A totally acceptable performance demonstrating an adequate level of attainment** for a student at a given stage of development. The C grade states that while not yet showing any unusual promise, the student may continue to study in the discipline with reasonable hope of intellectual development.

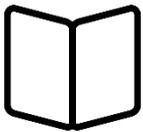
D **A marginal performance in the required exercises demonstrating a minimal passing level of attainment** for a student at a given stage of development. The D grade states that the student has given no evidence of prospective growth in the discipline; an accumulation of D grades should be taken to mean that the student would be well advised not to continue in the academic field.

F For **whatever reasons, an unacceptable performance.** The F grade indicates that the student’s performance in the required exercises has revealed almost no understanding of the course content. A grade of F should warrant questioning whether the student may suitably register for further study in the discipline before remedial work is undertaken.

## Support

While regular attendance and class participation are expected, I understand these are unprecedented and unpredictable times. We all are dealing with twin crises and each of us (instructors included) may need some grace this semester. [If you or your work are impacted by the pandemic, cultural issues, etc. this semester reach out to me as soon as possible via Piazza. Describe your situation and suggest a solution that would work for you. I care about each of you, and we will find a way to support you and your success in the course!!](#)

## COURSE RESOURCES



### Required Reading:

1) Primary Research Articles (*Neuron*, *Nature Neuroscience*, *Science*, *Cell*, *Journal of Neuroscience*, *eNeuro*, etc.)



### Required software/apps:

Poll Everywhere [poll.unc.edu](http://poll.unc.edu)  
Click the link to find revised instructions, login information, and answers to FAQ

Assignments, **worksheets for class notes**, piazza link, etc. can be found on the course Sakai site: <https://sakai.unc.edu/>

\*PowerPoint slides will be available **after** class to encourage our active learning environment and not give away answers! \*

## ACADEMIC INTEGRITY

All work that you do for this class must be completed according to the UNC Honor Code. You will maintain confidentiality of exams, and during exams, you will refrain from: looking at another person's exam; talking, either in person, by cell phone, or email; using the Internet, or any other text or notes. Please report any violations that you observe. It is your responsibility to speak with your Professor if you are not sure what constitutes plagiarism or have any questions about the Honor Code. Please review the academic code at UNC at [http://integrity.unc.edu/hc\\_handout.html](http://integrity.unc.edu/hc_handout.html). All suspected cases of academic misconduct must be reported to the Office of the Dean of Students, and I will do so if we suspect academic misconduct of any kind.



## DIGITAL ETIQUETTE



It will be necessary to use a digital device during class. Please be respectful of your classmates and restrict your use to course content. Ideally during zoom, we all will have our cameras on and use the chat for positive course related conversation only. We understand that some students cannot turn on cameras due to their personal learning environments but please join us if you are able. Also please remember to keep yourself muted, unless you are speaking, and know that when your camera is on your behavior affects everyone, so turn off your camera if you need to change your focus from class. We are all working and learning

team in class, and we're only as awesome as our weakest link!

## OTHER RESOURCES ON CAMPUS

The Writing Center is a wonderful resource to use if you need some help with your writing and editing skills, and The Learning Center would love to coach you – they have excellent coaching opportunities for things like time management, study skills, and goal setting. Give them a try!



If you experience difficulty during the semester that interferes with your ability to come to class or complete your work, including difficulty securing food or housing, or stress and mental health issues, I urge you to contact the Office of the Dean of Students (in person or by phone 919-966-4042) or Counseling and Psychological Services (in person or by phone 919-966-3658). If the Dean of Students is consulted, they can notify all of your instructors (for all of your classes) at your request. Their services are confidential – so while they may contact your instructors on your behalf to alert them that you are experiencing difficulty, they do not disclose details. I am also available to walk you over to Counseling & Psychological Services or the Office of the Dean of Students.

If you require an accommodation, please contact the Office of Accessibility and Resources (<https://ars.unc.edu>) and reach out to me and sign up for an office hour appointment. *I'd love to meet in the first few weeks of class to ensure your accommodation needs are being met appropriately! Plus*

**DIVERSITY and INCLUSION STATEMENT** In an ideal world, science would be objective. However, much of science is subjective and is historically built on a small subset of privileged voices. We will make an effort to learn about a diverse group of neuroscientists. We acknowledge that it is possible that there may be both overt and covert biases in the material due to the lens with which it was written, even though the material is primarily of a scientific nature. Integrating a diverse set of experiences is important for a more comprehensive understanding of science. We would like to discuss issues of diversity in neuroscience as part of the course from time to time.

*Furthermore, we would like to create a learning environment for students that supports a diversity of thoughts, perspectives and experiences, and honors all identities* (including race, gender, class, sexuality, religion, ability, etc.) To help accomplish this:

- If you have a name and/or set of pronouns that differ from those that appear in your official UNC records, please let us know!
- If you feel like your performance in the class is being impacted by experiences outside of class, please don't hesitate to come and talk with us. We are here to support you. Remember that you can also submit anonymous feedback to us as instructors on Piazza. The dean of students can also be a wonderful resource.
- I (like many people) am still in the process of learning about diverse perspectives and identities. If something was said in class (by anyone) that made you feel uncomfortable, please talk to me about it.
- As a participant in course discussions, please honor the diversity of your classmates.

We expect that everyone will respect our learning environment and each other.



We expect that we will all show integrity and academic honesty, respecting the honor code always.

## A note from Dr. Robertson...



You can expect me to...

- (1) Support your learning to the best of my ability.
- (2) Challenge you and grow your knowledge of cutting edge cellular & molecular neuroscience technology.
- (3) Cultivate an inclusive, equitable, and fair classroom learning environment for all students!

*I want you to succeed in this class!  
You belong here and deserve to be here!  
I want to know more about you!*

I teach several classes each semester, and always have several hundred students in any given semester. I encourage you to use the sign-up tool on the course Sakai site to ensure you get some face time when you need it. Despite the huge number of students I work with on a daily basis, each of you are truly special and important to me. I hope to support, not just your success in this course, but also your neuroscience career progress. Please come visit so I can learn more about you!

**New Required Syllabus Additions from the UNC Undergraduate studies office -sent to faculty on 8/7/2020.** Any student who is impacted by discrimination, harassment, interpersonal (relationship) violence, sexual violence, sexual exploitation, or stalking is encouraged to seek resources on campus or in the community. Please contact the Director of Title IX Compliance (Adrienne Allison – [Adrienne.allison@unc.edu](mailto:Adrienne.allison@unc.edu)), Report and Response Coordinators in the Equal Opportunity and Compliance Office ([reportandresponse@unc.edu](mailto:reportandresponse@unc.edu)), Counseling and Psychological Services (confidential), or the Gender Violence Services Coordinators ([gvsc@unc.edu](mailto:gvsc@unc.edu); confidential) to discuss your specific needs. Additional resources are available at [safe.unc.edu](http://safe.unc.edu).

Our course is remote only but here are the university standards: **Community Standards in Our Course and Mask Use.** While we are in the midst of a global pandemic, all enrolled students are required to wear a mask covering your mouth and nose at all times in our classroom. This requirement is to protect our educational community — your classmates and me – as we learn together. If you choose not to wear a mask, or wear it improperly, I will ask you to leave immediately, and I will submit a report to the [Office of Student Conduct](#). At that point you will be disenrolled from this course for the protection of our educational community. An exemption to the mask wearing community standard will not typically be considered to be a reasonable accommodation. Individuals with a disability or health condition that prevents them from safely wearing a face mask must seek alternative accommodations through the [Accessibility Resources and Service](#). For additional information, see [Carolina Together](#).

## NSCI 423 NeuroTech Schedule

### Synchronous Zoom Sessions MWF

**\*Schedule Disclaimer\*** NSCI 423 is intended to develop our research related skills. The following schedule is our best prediction of our work this semester, but it is a static document. The schedule will change. For example, our first week of class, we will select two research papers to explore together so those papers will not be listed in this schedule. ***Sakai is not static, so to ensure that you are prepared each week be sure you check the class pre-work found in the weekly lesson tab on Sakai.*** To ensure fruitful discussion and active learning, we all need to prepare for class. ***Each lesson requires pre-class work due 9:00AM prior to the start of class.*** RAW stands for research analysis worksheet in the schedule.

Our course and schedule are structured around four themes of the [NIH's BRAIN Initiative](#). We will discuss the BRAIN Initiative in our first week of class. The themes (described below) are color coded in the syllabus to help organize the research topics in our course in a conceptual framework.

#### **BRAIN Initiative Themes:**

Generating a census of cell types and map of their connections

Measure the fluctuating patterns of electrical and chemical activity flowing across brain circuits

Understand how this interplay creates our unique cognitive and behavioral capabilities

Translation to treat neurobiological disorders

#### **Section 001 - 10:10-11:00am**

Zoom Meeting Information:

<https://unc.zoom.us/j/98905914457?pwd=S0dCbExlTmRZb092L1UrL3dPTmJJQT09>

Meeting ID: 985 0856 1454

Passcode: 648396

#### **Section 002 - 11:15am-12:05pm**

Zoom Meeting Information:

<https://unc.zoom.us/j/98431493682?pwd=UzVFdDk5NFNZcklwcmpzWE5keExDdz09>

Meeting ID: 984 3149 3682

Passcode: 857537

	MONDAY	WEDNESDAY	FRIDAY
1/18 Week1	<b>NO CLASS!</b> <b>Classes Start Tuesday 1/19</b>	<b>FDOC: Course &amp; Syllabus Overview</b>  <b>Pre-class work:</b> <ol style="list-style-type: none"> <li>1. Read Syllabus carefully &amp; post two questions about Syllabus or Schedule in our Google Doc</li> <li>2. Create a <a href="#">Virtual Business Card</a></li> <li>3. Listen to the <a href="#">CRISPR Story</a></li> </ol>	<b>BRAIN Initiative &amp; Studying the Brain</b>  <b>Pre-class work:</b> <ol style="list-style-type: none"> <li>1. RAW on the paper “The BRAIN initiative: developing technology to catalyze neuroscience discovery” Jorgenson et al. 2015</li> <li>2. Check out BRAIN Initiative infographic</li> <li>3. Explore the BRAIN Initiative <a href="#">website</a></li> </ol>
1/25 Week2	<b>Teamwork!</b> <b>Select Student Choice Journal Clubs</b> <b>Pre-class work:</b> <ol style="list-style-type: none"> <li>1. Bring 3 codes of conduct to share with peers</li> <li>2. As a group, <a href="#">nominate a cellular/molecular neuroscience paper</a></li> <li>3. Review nominated articles &amp; vote!</li> </ol>	<b>Neuroethics</b>  <b>Pre-class work:</b> <ol style="list-style-type: none"> <li>1. Read Neuroethics Guiding Principles</li> <li>2. Read Continued Access to DBS</li> <li>3. Read Ethical future for Organoids</li> </ol>	<b>Animal Research</b>  <b>Pre-class work:</b> <ol style="list-style-type: none"> <li>1. Read <a href="#">Animal Research at UNC</a></li> <li>2. Click on thought clouds to learn about <a href="#">animal research</a></li> <li>3. Watch the <a href="#">Ted Talk on lab animal restraint</a></li> </ol>
2/1 Week3	<b>Alternatives to Animal Research: “Mini Brains” and Coronavirus</b>  <b>Pre-class work:</b> <ol style="list-style-type: none"> <li>1. RAW on the paper “<a href="#">Infectability of Human BrainSphere Neurons...</a>” 2020</li> </ol>	<b>Classifying Neuronal Diversity</b>  <b>Pre-class work: CHECK Sakai</b> <ol style="list-style-type: none"> <li>1. Allen brain atlas exploration</li> <li>2. <a href="#">Know your Neurons</a></li> <li>3. Be ready to use your computers</li> </ol>	<b>Case study 1: Mapping Human Neuron Diversity in the Search for New Therapies. Part I</b>  <b>Pre-class work: CHECK Sakai</b> <ol style="list-style-type: none"> <li>1. Read “The Seizures of Epilepsy” excerpt</li> <li>2. Watch 2-minute neuroscience <a href="#">video</a></li> <li>3. Begin Case and answer pre-case questions</li> </ol>
2/8 Week4	<b>Case study 1: Mapping Human Neuron Diversity in the Search for New Therapies. Part II</b>  <b>Pre-class work: CHECK Sakai</b> <ol style="list-style-type: none"> <li>1. Continue any unfinished data collection</li> <li>2. Begin Data analysis with group if you want to get ahead</li> </ol>	<b>Journal Club: Gene expression &amp; RNA seq reveals new human neuron</b>  <b>Pre-class work: CHECK Sakai</b> <a href="https://www.nature.com/articles/s41593-018-0205-2">https://www.nature.com/articles/s41593-018-0205-2</a> **RAW on paper	<b>Journal Club: Gene expression &amp; RNA seq reveals new human neuron</b>  <b>Pre-class work: CHECK Sakai</b> <a href="https://www.nature.com/articles/s41593-018-0205-2">https://www.nature.com/articles/s41593-018-0205-2</a> **RAW on paper

2/15 Week5	<b>NO CLASS! Wellness Day</b>	<b>Mapping the Connectome</b>  <b>Pre-class work: CHECK Sakai</b> 1. Read web links about DTI & RV 2. Watch videos on CLARITY & serial EM	<b>Fate Mapping Neurons</b>  <b>Pre-class work: CHECK Sakai</b> 1. Watch JOVE video on Fate mapping 2. Read web link on Fate mapping <b>Group Case study 1 Due</b>
2/22 Week6	<b>Journal Club: Fate Mapping and Intersectional Genetic Approaches</b>  <b>Pre-class work: CHECK Sakai</b> 1. <i>Cell Reports</i> Brust 2014**RAW due	<b>Observing the Brain in Action</b>  <b>Pre-class work: CHECK Sakai</b> 1. Jigsaw Activity (3 minute presentations)	<b>Neurotransmitter Detection</b>  <b>Pre-class work: CHECK Sakai</b> 1. Read about <a href="#">Microdialysis</a> , FSCV, <a href="#">TANGO</a> 2. Identify 1 strength and 1 limitation for each technique
3/1 Week7	<b>Calcium Indicator Imaging</b>  <b>Pre-class work: CHECK Sakai</b> 1. Read about Calcium indicators and in vivo brain imaging approaches	<b>Student Choice Journal Club</b>  <b>Pre-class work: CHECK Sakai</b> 1. RAW on the paper we select as a class	<b>Student Choice Journal Club Exam Review session</b>  <b>Pre-class work: CHECK Sakai</b> 1. Submit four multiple choice questions based on your assigned student LOs
3/8 Week8	<b>EXAM 1</b>	<b>Manipulating Neural Activity</b>  <b>Pre-class work: CHECK Sakai</b> 1. Read introductions to memory papers 2. Concept Map for each introduction	<b>NO CLASS! Wellness Day</b>
3/15 Week9	<b>Optogenetics &amp; Memory Engrams</b>  <b>Pre-class work: CHECK Sakai</b> 1. <i>Nature</i> Liu. 2012 2. Figure Annotations due	<b>Chemogenetics &amp; Memory Engrams</b>  <b>Pre-class work: CHECK Sakai</b> 1. <i>Science</i> Garner et al. 2012 2. Figure Annotations due	<b>Memory Engrams: Chemogenetics vs Optogenetics</b>  <b>Pre-class work: CHECK Sakai</b> 1. Finish Reading articles 2. Design the next experiment 3. Compare the approaches
3/22 Week 10	<b>Journal Club: Student Choice</b> <b>Pre-class work: CHECK Sakai</b> 1. Choose your own adventure pre-work (RAW or figure annotations & concept map)	<b>Journal Club: Student Choice</b> <b>Pre-class work: CHECK Sakai</b> 1. Choose your own adventure pre-work (RAW or figure annotations & next experiment) <b>Group Research Design Outline Due</b>	<b>Case Study 2: Seq'ing a Cure Part I</b>  <b>Pre-class work: CHECK Sakai</b> 1. NGS/CRISPR homework 2. Jigsaw activity (2-3 min presentations)

3/29 Week 11	<b>Case Study 2: Seq'ing a Cure Part II</b>  <b>Pre-class work: CHECK Sakai</b> 1. Neuro Disease Research	<b>Case Study 2: Seq'ing a Cure Part III</b>  <b>Pre-class work: CHECK Sakai</b> 1. Data analysis	<b>NO CLASS!</b> <b>Spring Holiday</b>
4/5 Week 12	<b>NO CLASS!</b> <b>Wellness Day</b>	<b>Case Study 2: Seq'ing a Cure Part IV</b> <b>Journal Club</b>  <b>Pre-class work: CHECK Sakai</b> 1. Choose your own adventure pre-work (RAW or figure annotations & concept map)	<b>Case Study 2: Seq'ing a Cure Part V</b> <b>Journal Club</b>  <b>Pre-class work: CHECK Sakai</b> 1. Choose your own adventure pre-work (RAW or figure annotations/next experiment)
4/12 Week 13	<b>Parkinson's Disease</b>  <b>Pre-class work: CHECK Sakai</b> 1. Frozen Addict video, 2-min neuro videos & Reflection questions	<b>Journal Club: Stem Cell Therapy and Parkinson's Disease I</b>  <b>Pre-class work: CHECK Sakai</b> 1. <i>Nature</i> Kikuchi et al. 2017 2. Choose your own adventure pre-work	<b>Journal Club: Stem Cell Therapy and Parkinson's Disease II</b>  <b>Pre-class work: CHECK Sakai</b> <i>Nature</i> Kikuchi et al. 2017 <b>Group Case Study 2 due</b>
4/19 Week 14	<b>Gene Therapy</b>  <b>Pre-class work: CHECK Sakai</b> 1. Group assigned reading from Hudry "Therapeutic AAV Gene.."	<b>Journal Club: Gene Therapy II</b>  <b>Pre-class work: CHECK Sakai</b> 1. Choose your own adventure pre-work on SMA research article <b>Meeting notes submitted from research design group meeting</b>	<b>Gene Therapy III – Industry perspective</b>  <b>Pre-class work: CHECK Sakai</b> 1. Read about the Gene Therapy Industry 2. Submit two questions for our guest speaker Dr. Patrick Robertson 3. Be ready to be excellent UNC hosts 😊
4/26 Week 15	<b>Case Study 3: You are what you eat Part I</b>  <b>Pre-class work: CHECK Sakai</b> 1. Read Blog and review resources 2. Answer Microbiome Case questions	<b>Case Study 3: You are what you eat Part II</b> <b>Exam 2 Review Session</b>  <b>Pre-class work: CHECK Sakai</b> 1. Submit four multiple choice questions based on your assigned student LOs	<b>EXAM 2</b>
5/3 Week 16	<b>Case Study 3: You are what you eat</b> <b>Pre-class work: CHECK Sakai</b> 1. Read about your assigned topic 2. Jigsaw activity (2min presentations)	<b>LDOC</b> <b>Course Evals</b> <b>Semester Wrap up</b> <b>Case Study 3 Worktime</b>	<b>NO CLASS!</b> <b>Classes End Wed May 5<sup>th</sup></b> <b>Group Case Study 3 due Friday 5/7</b>
<b>FINAL EXAM TIME – TBA by the University. We will present our Group Research Design Presentations during our Final time via Zoom.</b>			