

NEUR 2050

Introduction to Neuroscience

Tuesdays/Thursdays 10:30 – 11:45 am

Lindquist Hall 104

Fall 2019

Instructors: Todd Hillhouse PhD & Jim Hutchins PhD

Contact methods

Canvas messaging preferred

Email: toddhillhouse@weber.edu; jimhutchins@weber.edu

Todd Hillhouse's office: Lindquist Hall 392

Todd Hillhouse's office hours: Tuesday/Thursday: 9:00-10:30am

Jim Hutchins' office: Lindquist Hall 394

Jim Hutchins' office hours: noon – 1 pm TuTh

[I have a second office on the Davis Campus D3 218 office hours MW noon – 1 pm, if that's more convenient for you]

Call Roe at 801 626 6293 or email rosemarieschoof@weber.edu to set an appointment with either Dr. Hillhouse or Dr. Hutchins

Contact information: The best way to contact us is through Canvas messaging. If necessary, you may email us or call the program office (801 626 6293). Rosemarie (Roe) Schoof is the administrative assistant for the Neuroscience Program and has access to our calendars.

For all computer issues, contact WSU Online (801 626 6499) during business hours. You can also contact the Help Desk (801 626 7777, open 24/7). We have a deal with them: we don't fix computers; they don't teach Neuroscience.

Course Methodology

This is a three-credit-hour course which meets on Tuesdays and Thursdays at 10:30 am on the Weber State University Ogden Campus, Lindquist Hall 104. There are two primary modes of instruction: lectures based on the textbook, and self-study (videos and reading assignments) from the same book.

Lecture Powerpoints will be made available to students through the Canvas course. Video lectures are available and may be used by students who cannot attend lecture for any reason, or if students want to use them for self-study. Additionally, some class sessions will include a brief handout of some sort.

Textbook

We will rely heavily on the textbook for reading assignments before lecture as well as self-study for exams. The textbook will be the primary source for exam questions, with lecture material (Powerpoints) as a secondary source. For that reason, you are **required** to rent or purchase the textbook. We don't care where you obtain it, as long as it's a usable copy. The media which is normally packaged with the book, and access to the LWW ThePoint website, are nice but are not required. A quick check shows that used/rental copies are available for as low as \$23 and digital copies for \$9 so this should not be a great burden for students.

Bear MF, Connors BW and Paradiso MA. *Neuroscience: Exploring the Brain*, 4th ed. ISBN 978-0-7817-7817-6.

If you want, you may use earlier editions of the textbook, but test questions will be taken from the 4th edition so you may miss out if you decide on this option.

Course Objectives

Overall objectives of the course are:

1. To introduce the student to the molecular and cellular basis of nervous system function.
2. To explain how the nervous system receives, processes, and transmits information, using the cellular structures described. The synapse, a point of contact between a nerve cell and a target cell, will be a special focus for the study of information processing in the nervous system.
3. To learn the name and location of brain structures which are involved in the brain functions we'll study, including visual system, motor system, and higher-order functions.
4. To study how the brain processes sensory information. We only have time to study one sensory system; this semester, we will focus on the visual system. Just as individual cells receive, process, and send information, the systems of the brain work the same way. We will study how the visual system receives, processes, and sends information to higher-order sensory structures.
5. To study how the brain processes motor information. What are the sources of motor (movement) information? How is that information processed? How do the effectors of the motor system (muscles) work?
6. For the systems controlling sexual behavior, language, and memory, study these systems and their operation from the molecular level all the way up to the systems level.
7. To understand how the brain develops from primordial structures.

Course Grade

Exams: 80% of final grade

There will be four exams, one given at the end of each module as a way of assessing your progress on meeting the objectives listed for each module. Each exam counts for 20% of your grade.

Exams 1-3 will be due on a Monday and must be taken at a Weber State testing center or with a secure proctor. There will be a minimum of at least three days to take each exam (i.e. the exam will always be ready for you to take by the previous Thursday).

Exams 1-3 may be taken up to three days late (i.e. by close of business the Thursday after the full-credit due date). Each day late will accumulate a 10% penalty, so the highest possible score for exams taken Tuesday will be 90%, on Wednesday 80%, and Thursday 70%. Any exams not taken by three days late will be entered in the gradebook as a zero. These deductions may be waived in exceptional circumstances.

Exam 4 must be taken by the last day of finals week. It is not comprehensive. Since all coursework must be completed by this day, Thursday, December 12, 2019, no late exams will be available.

Exam Schedule

Module 1	Chapters 1-4	Sept 16	20%
Module 2	Chapters 5-7 (+ atlas)	Oct 14	20%
Module 3	Chapters 9, 10, 13, 14	Nov 11	20%
Module 4	Chapters 16, 17, 20, 22	Dec 12	20%

Reading Quizzes: 10% of final grade

Fifteen times during the semester, the reading materials which should be completed by that week will be the basis for an open-book, open-note, open-classmate exam taken in Canvas. In general, this reading quiz will close on the day before the corresponding lecture at 11:59 pm (i.e. must be done before you come to class) but there may be some exceptions; consult the calendar for the dates of each quiz. The first of these, covering Chapter 2, will be due Wednesday, Aug 28. Fifteen of these weekly reading quizzes are available. The lowest five scores will be dropped, for a total of 10 reading quizzes which count towards your grade. (Dropped scores are indicated as shaded numbers in the Canvas gradebook.) Each of the 10 reading

quizzes is worth 1% of your final course grade, for a total of 10% of your final grade for all reading quizzes in aggregate.

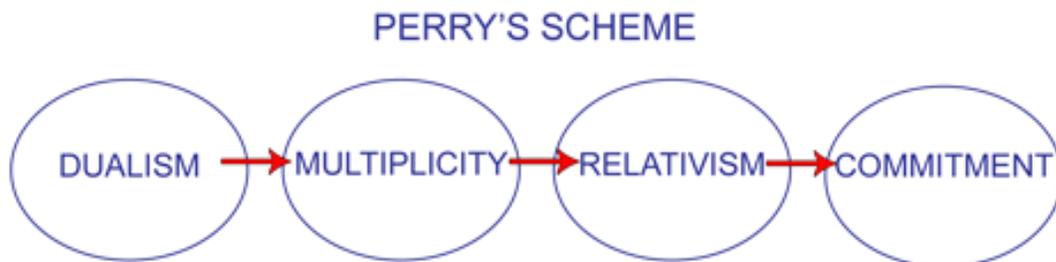
Writing Assignments (R2SR&Rs): 10% of final grade

The first draft of each R2SR&R (see below for explanation): 1% of final grade

The second draft of each R2SR&R: 1.5% of final grade

There will be four R2SR&R exercises for a total of 10%.

You may have encountered something called a Signature Assignment in your General Education classes. It is important to us that we don't lose the educational benefit which comes from doing these Signature Assignments based on General Education Learning Outcomes (GELOs). Even though this isn't a General Education class, and so it's not an "official" Signature Assignment, we're going to do something very similar for this class as a writing assignment designed to help you move as far along Perry's scheme of intellectual development as you're able. There is [more about Perry's scheme here](#), and we're quoting from that website.



Perry's Scheme of intellectual development proposes nine positions or levels with the transformative sequences that connect them.

1. Dualism – knowledge is received, not questioned; students feel there is a correct answer to be learned.
2. Multiplicity – there may be more than one solution to a problem, or there may be no solution; students recognize that their opinions matter.
3. Relativism – knowledge is seen as contextual; students evaluate viewpoints based on source and evidence, and even experts are subject to scrutiny.
4. Commitment within relativism – integration of knowledge from other sources with personal experience and reflection; students make commitment to values that matter to them and learn to take responsibility for committed beliefs. There is recognition that the acquisition of knowledge is ongoing activity.

That's why we have GELOs, to move you along that scheme of intellectual development. It's the true value of a college education and a skill set that is highly

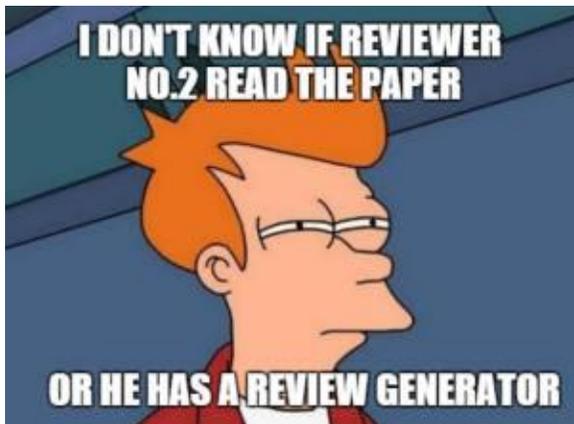
prized by employers. If you get good at this process, you'll be able to write your ticket in whatever career you choose.

In the past, we've asked students to read and respond to research papers from the primary literature. This has not worked well. I have decided to abandon that approach and try a new one. Instead of asking you to read peer-reviewed research and asking you to envision how it came to be (which requires a lot of imagination, one should think), now we are going to model one aspect of the process of peer review of research papers so you can see for yourself how peer review works.

When we submit a research paper, it goes to a managing editor. They then distribute our paper to three reviewers. Those reviewers write a narrative review and check one of three boxes:

1. Accept without revision
2. Revise and resubmit
3. Reject

Researchers dream of getting three reviewers to check box 1. (In Dr. Hutchins' life,



it happened exactly once, and it was magical. He saw unicorns.) Too often, we get rejected. But the most common outcome is to get “revise and resubmit”.

(It is so common for reviewers #1 and #3 to like your paper, and reviewer #2 to hate it, that there are even memes and [blog posts about it](#). One of us is going to be reviewer #2.)

For this reason, we're calling this Writing Assignment “Reviewer #2 Says: Revise and Resubmit” (R2SR&R).

Write a two-page, double-spaced paper on the listed topic. Put the number of the question you are answering (e.g., 1A) and your name at the top of the first page. Your audience is Reviewer #2, a busy and slightly harried college professor who doesn't have time for your nonsense. He's a stickler for grammar and clear expression of ideas, so make sure you have a colleague or the Writing Center look over your submission before you send it in. Reviewer #2 is an a**hole sometimes and we don't want to give him any excuse to ream you out for minor spelling and grammatical errors.

Page limits will not be strictly enforced, but the more you deviate from our guideline, the better argument you must make.

You will receive 1 point (1% of your grade) for turning in your brief paper on time (see calendar for due dates).

You will receive 1.5 points (1.5% of your grade) for replying to my critique of your paper.

There is one Writing Assignment per module of the course. Each deadline is about a week before the module exam, so we would encourage you to think deeply about the question you've chosen as a way of focusing your studies. Because there are four writing assignments, each worth 2.5% of your grade, they are worth 10% of your grade in aggregate. (In other words, if you choose not to submit any writing assignments, the highest grade you may receive in the course is a 90% — if everything else you submit is perfect.)

A grading rubric is posted in Canvas.

R2SR&R-1

- Your first attempt at R2SR&R-1 is due in Canvas Sunday, Sept 22 at 11:59 pm
- We will respond to your first attempt by Monday, Sept 23 at 11:59 pm
- You will revise and resubmit R2SR&R-1 in Canvas by the deadline of Friday, Sept 27 at 11:59 pm.

This R2SR&R is based on GELO 2.

GELO 2: Intellectual Tools

This outcome focuses on students' use of and facility with skills necessary for them to construct knowledge, **evaluate claims**, solve problems, and communicate effectively.

For this assignment, you are asked to critically evaluate claims made online about neuroscience topics covered in the first few chapters of the text. Find the page we've quoted, read the context of the quote carefully, and use the peer-reviewed scientific literature to complete the assignment. (By "peer-reviewed", I mean that all your references must be available via <https://www.ncbi.nlm.nih.gov/pubmed/> but you may use the links on the webpage containing the claim, Google Scholar, or other means to explore the literature. Any sources you use should be checked in the PubMed database, however.)

You should choose ONE of the assignments (1A, 1B, or 1C) listed below.

1A. Wikipedia claims: “For neurons, the Na⁺/K⁺-ATPase can be responsible for up to 3/4 of the cell's energy expenditure.” Evaluate the evidence for this claim.

1B. Wikipedia claims: “[Glutamate] is used by every major excitatory function in the vertebrate brain, accounting in total for well over 90% of the synaptic connections in the human brain.” Evaluate the evidence for this claim.

1C. The DNA Learning Center claims: “GABA occurs in 30-40% of all synapses- only glutamate is more widely distributed.” Evaluate the evidence for this claim.

R2SR&R-2

- First attempt (1%) due in Canvas Sunday, Oct 20 at 11:59 pm
- Response due from instructor within 24 hours of submission
- Second attempt due in Canvas Friday, Oct 25 at 11:59 pm.

This R2SR&R, like the first one, is based on GELO 2.

GELO 2: Intellectual Tools

This outcome focuses on students' use of and facility with skills necessary for them to construct knowledge, evaluate claims, **solve problems**, and communicate effectively.

Select ONE of the following questions to answer:

2A. Why is it impossible to die from a cannabis overdose?

2B. Why do physicians put stroke or trauma patients in a medically induced coma?

2C. Why do some people have adverse reactions to monosodium glutamate (“Chinese restaurant syndrome”)?

R2SR&R-3

- First attempt due in Canvas Sunday, Nov 17 at 11:59 pm
- Response due from instructor within 24 hours of submission
- Second attempt due in Canvas Friday, Nov 22 at 11:59 pm.

This R2SR&R is based on GELO 4. We have now moved far enough into our understanding of the nervous system it's time to reach for constructed knowledge.

GELO 4: Connected & Applied Learning

This outcome emphasizes how students' learning in general education classes [or in Intro Neuro] can be connected and applied in meaningful ways to new settings and complex problems.

Pick one of the following questions:

3A. Design an experiment to determine why different people see different colors “the dress” in different colors.

3B. Design an experiment to determine what V4 does.

3C. Design an experiment to infer the motor unit size of different muscles (name at least three specific muscles you will test).

3D. Create an infographic, mind map, or similar graphical representation of how the different areas of motor cortex (areas 4, 6, 8, and Broca's area, at a minimum) relate to one another, to other motor nuclei (red nucleus, cranial nerve nuclei, cerebellum), and to the alpha motor neurons of the spinal cord. (Page guidelines do not apply to this question.)

R2SR&R-4

- First attempt due in Canvas Sunday, Dec 1 at 11:59 pm
- Response due from instructor within 24 hours of submission
- Second attempt due in Canvas Friday, Dec 6 at 11:59 pm.

This R2SR&R is based on GELO 3. It's time to see how our understanding of Neuroscience alters our perception of the world around us and our relationship to others.

GELO 3: Responsibility to Self and Others

This outcome highlights students' relationship with, obligations to, and sustainable stewardship of themselves, others, and the world to promote diversity, social justice, and personal and community well-being.

Pick one of the following questions:

4A. Make a recommendation to a friend who is struggling with drug addiction based on what you read or studied in Chapter 16 (Motivation).

4B. Make a recommendation to the local school board that is considering whether to permit the creation of a LGBTQ+ student club at the junior high school level based on what you read or studied in Chapter 17 (Sex and the Brain).

4C. Make a recommendation to your state Board of Education regarding curriculum changes in the teaching of foreign languages based on what you you read or studied in Chapter 20 (Language).

4D. Make a recommendation to local government regarding the provision of services for the mentally ill based on what you read or studied in Chapter 22 (Mental Illness).

Grading Scale

The following scale will be used to determine your letter grade in the course:

<u>Numeric Score</u>	<u>Letter Grade</u>
93-100	A
90-92	A-
87-89	B+
83-86	B
80-82	B-
77-79	C+
73-76	C
70-72	C-
67-69	D+
63-66	D
60-62	D-
Below 60	E

Course Outline	
Class Dates	Topics
August 27, 29 September 3, 5, 10, 12	Introduction to Neuroscience Focus on <i>History of Neuroscience</i> Chapter 1 in Bear Cells and membranes of the nervous system; the excitable membrane Focus on <i>Cellular & Molecular Neuroscience</i> Chapters 2, 3 and 4 in Bear
September 17, 19, 24, 26 October 1, 3, 8, 10	Neuronal signaling: how neurons receive, integrate and transmit information Focus on <i>Cellular & Molecular Neuroscience</i> Chapters 5 and 6 in Bear Neuroanatomy: what are the basic parts of the nervous system that we will explore in the remainder of the course? Focus on <i>Neuroanatomy</i> Chapter 7 in Bear, including atlas (colored-edge pages)
October 15, 17, 22, 24, 29, 31 November 5, 7	Intro to Systems Neuroscience: <ul style="list-style-type: none"> • one of the sensory systems (this semester, the visual sense) • motor systems Focus on <i>Systems Neuroscience</i> Chapters 9, 10, 13 and 14 in Bear
November 12, 14, 19, 21, 26 No class Nov 28 (Thanksgiving Day) December 3, 5	Systems of the brain specialized for sexual behavior Development of the brain Learning and memory systems and mechanisms Focus on <i>Systems & Developmental Neuroscience</i> Chapters 16, 17, 20 & 22 in Bear

Academic Dishonesty/Plagiarism/Cheating

We encourage students to work and study together whenever possible.

However, **students must hand in their own work**. Whenever you try to pass off someone's work that is not your own, that is cheating. If you cheat on ANY assignment (even extra credit), you will receive a grade of **E (Failing) for the course**. Plagiarism is when you represent someone else's ideas or words as your own. For a very detailed description of plagiarism, please go to the Policies and Procedures Manual (link below) and review the PLAGIARISM description. You are responsible for knowing what constitutes plagiarism. ANY plagiarism (even unintentional) will result in a failing grade in the course. Please refer to the following web site for a complete listing of infringements that constitute cheating:

<http://documents.weber.edu/ppm/6-22.htm>.

Differently-Abled Students

Any student requiring accommodations or services due to a disability must contact Disability Services in room 181 of the Student Service Center. I cannot make any accommodations without their analysis and recommendation.

Students' Rights and Responsibilities

Please refer to the following web site for a complete listing of all WSU student rights and responsibilities:

<http://documents.weber.edu/ppm/6-22.htm>

NOTE: The course syllabus provides a general plan for the course. I am committed to following the syllabus but there is no guarantee that I will. Altering the syllabus may also mean changing the nature or timing of exams/assignments. **By continuing in the course after reading the syllabus, you are indicating that you accept the terms of the syllabus.** July 16 is the last day to drop with a W, convert to credit/no credit, or convert to auditing the class. If you disappear before that date without officially withdrawing, then you will receive a UW (unofficial withdrawal). If you disappear or miss assignments after that date, you will be given a letter grade but all missing assignments will be included as zeroes. In general, most students who miss assignments receive an E for the course.