NSCI 320-080 - Introduction to Neuroscience

Instructor: Dr. Stuart McCaughey
Office: Rm. 431 Wolf Hall
Phone: 302-831-0361
E-mail: smccaughey@psych.udel.edu
Office hours: Mon & Wed 2:00-2:30 pm; Tue 4:00-5:00 pm, or by appointment

Dates: Aug. – Dec. 2019
Meeting times: Tue & Thu 2:00-3:15 pm
Classroom: 024 Quaesita Drake Hall
Lab room: 227 HSC (Star Campus)
Textbook: "Do Zombies Dream of Undead Sheep?: A Neuroscientific View of the Zombie Brain", by Timothy Verstynen and Bradley Voytek (ISBN = 978-0691157283)

Grading: 60% from exams (3 total, each worth 20%)
10% from lab practical
10% from individual presentation
10% from in-class iClicker quizzes (3 lowest quiz scores will be dropped)
10% from Involvement (frequency of contacting instructor, taking practice quizzes, etc. – see below)

Course objectives:

What makes a person truly human, with all of the attendant abilities to not only survive, but also to excel beyond the capacities of the other species on this planet? In this course, we will consider how the properties of individual nerve cells, along with the large-scale organization of the human brain, allow us to navigate through our environments and perform the sophisticated functions that define the human experience. It will be assumed that students have some prior experience with the basics of neuroscience, but the first part of the course will include a review of the properties of individual cells and the general organization of the nervous system. Later lectures will thoroughly explore specific sensory and motor abilities, as well as more complex cognitive processes and types of behaviors. Although the primary focus will be on normal brain function, we will also consider the consequences of neuronal damage. This will be done, in part, by using zombies (as depicted in films such as "Night of the Living Dead") as theoretical models of partial brain impairment.

By the end of the course, students should be able to: 1) identify the major structures of the nervous system and state their function; 2) describe how neurons normally communicate with each other and how this process can be altered by drugs and other factors; 3) name important cells and regions involved in specific sensory, motor, behavioral, and cognitive functions; 4) consider how variations between individuals can be explained by differences in the underlying neural substrates; 5) describe the consequences of damage to a specific part of the nervous system; and 6) discuss controversies in the field of neuroscience.

Lectures:

Initial lectures will provide an introduction to the nervous system's basic organization and the characteristics of its cells. Subsequent lectures will focus on specific sensory, motor, and cognitive functions. Although the lecture material will overlap with the assigned readings, much of the text and

figures will be drawn from other sources. Because of this, the lecture slides will be available on Canvas and can be reviewed outside of class. Nonetheless, students should attempt to understand the slides fully during the lecture itself and ask questions when necessary. For each lecture, a list of Objectives will also be posted on Canvas in order to highlight the general topics of greatest importance. Typically the lecture slides will be accessible to you on Canvas the day beforehand. Please note, though, that all material from lectures and elsewhere in the course (e.g., posted online) is meant solely for the current students of NSCI 320-080 and is NOT to be distributed to those outside of the course.

Labs:

There will be a total of 7 labs, with a lab practical taking place during lab 7 in order to test students' skills at identifying structures on brain specimens and answering other questions. Please note that on lab days, class will meet in a different room (room 227 HSC, on the Star campus) than on lecture days. During labs, students will have a chance to observe preserved sheep and human brains, models, and other resources that are intended to provide a full three-dimensional understanding of the brain, which is difficult to achieve solely based on books and other two-dimensional sources. Assigned readings for labs will be hand-outs distributed during the labs themselves and also posted to Canvas. The lab periods are meant to reinforce the material covered in lectures, and some labs (e.g., those that occur right before an exam) will include not only dissection, but also review of prior material and group discussion questions. An attempt has been made to partially synchronize the specific topics between the two, but the order of labs is also related to the physical properties of the brain specimens, and so it does not line up perfectly with the order of the lectures, which is based primarily on conceptual aspects of the nervous system.

Students will be assigned randomly into groups for labs. These groups will work together not only during dissection activities, but also on occasional team-based learning exercises (on both lab and lecture days). All students must attend a mandatory safety training session prior to the first lab, and they must follow proper safety procedures (e.g., wearing gloves) during labs. Additional details of these procedures will be provided in class and on Canvas. Make sure you are clear on what is expected of you before attending the first lab.

Textbook: "Do Zombies Dream of Undead Sheep?: A Neuroscientific View of the Zombie Brain", by Verstynen & Voytek

Most lectures have an associated assigned reading in your text or on Canvas, which ideally should be skimmed ahead of class, and then reviewed in more detail afterwards. Note that the lecture order will roughly follow the order of the textbook, but with some exceptions. Lectures and readings will provide alternate approaches to the material, with partial overlap but also details that are unique to each one (please contact the instructor if parts of the text are not clear). Any material found in your assigned readings might be used as a source of exam questions, though in general the most important material will appear in lectures.

Canvas and iClickers:

Information on how to use Canvas is available through the Canvas Student Guide (https://community.canvaslms.com/docs/DOC-10701 - contact the instructor or TA if you are having difficulties). Several different kinds of resources will be posted online on the Canvas system, including: 1) lecture slides; 2) objectives for each lecture, summarizing the most important topics that will be

covered; 3) practice quizzes; and 4) neuroscience-related files (e.g., movies) and links to web pages. You can take the online quizzes as often as you like, and they will not contribute any specific percentage to your grade. Your scores on them are not important, but note that the instructor will keep track of how often you took the quizzes and factor that into your Involvement score for the course (see below). Canvas will also be used for announcements and class-wide communications. Make sure that you are familiar with how to access the course page on Canvas and check it often.

Also make sure that you have purchased your iClickers (general information on them is available at ats.udel.edu/clickers) and registered them with Canvas (see the following link for more information: https://docs.google.com/document/d/1rWme7TULD4a9hMaqm1aBSI24CN2CHVBOP9Rj51BLWYo/edit). Also make sure that your iClicker is functional (e.g., charged batteries) for each class. All classes will have an iClicker quiz (sometimes graded, sometimes not), which will be used to take attendance.

Grading:

The 3 exams will, collectively, count for 60% of the final grade (20% each), and all will be cumulative, covering all prior course material. The final lab will be devoted to a practical exam worth 10% of the final grade. An individual presentation assignment, given near the end of the course, will be worth 10% of the final grade (additional details on this assignment will be provided in class and on Canvas). In-class iClicker quizzes will be given, and the average across all of these quizzes (excepting the 3 lowest scores, which will be dropped) will make up 10% of the final grade. Graded iClicker quizzes will occur during some, but not all, lectures (unless told otherwise, assume you are having one for any given lecture). The final 10% of the grade will be based on a student's involvement throughout the course, as determined by: 1) class attendance, 2) seeking help outside of class from the instructor, 3) taking practice quizzes on Canvas, and 4) frequency of asking questions and speaking during lecture. In general, a perfect Involvement score will be given only for students who show active course involvement through all four of these categories. Students who merely attend and complete Canvas quizzes can still earn high Involvement scores if they perform well on exams, but if students perform poorly on exams, then they are expected to seek help with material outside of class and will receive a low Involvement score if they fail to do so.

Make-up exams will be available only for students who have a valid excuse backed up by evidence (e.g., illness and a doctor's note) and who have contacted the instructor as soon as possible about the issue, or for students with valid excuses who have made arrangements ahead of time with the instructor. Students who perform unsatisfactorily on early exams should meet with the instructor in order to understand their strengths and weaknesses, and to formulate a strategy for improving their scores on later exams. It is important address any difficulties as soon as a problem arises, given the cumulative nature of the material.

The final course grade will be given based on the overall performance and by adding up the percentages described above. In general, the cut-offs for different grades will fall on round numbers (see below for the likely cut-offs). If a student just barely misses a grading cut-off, in rare cases the score may be rounded up by less than 0.5 points and the higher grade given. However, this will occur only in situations where the student has a perfect Involvement score.

Grade cut-offs: A = 93.0; A- = 90.0; B+ = 87.0, B = 83.0, B- = 80.0, C+ = 77.0, C = 73.0, C- = 70.0; D+ = 67.0, D = 63.0, D- = 60.0, F = below 60.0.

Inclusion of Diverse Learning Needs:

Any student who thinks he/she may need an accommodation based on a disability should contact the Office of Disability Support Services (DSS) office as soon as possible. The DSS office is located at 240 Academy Street, Alison Hall Suite 130, Phone: 302-831-4643, fax: 302-831-3261. You may also contact DSS at dssoffice@udel.edu.

Academic honesty:

This course follows the University of Delaware Policy on academic dishonesty. Please read the policy published by the Office of Student Conduct (https://sites.udel.edu/studentconduct/sgup/) for more details. All work submitted as part of graded assignments (i.e., exams and graded in-class iClicker quizzes) is to represent the student's own knowledge without accessing outside texts or resources. Also bear in mind that the Code of Conduct pertaining to academic honesty specifically addresses iClicker use, and that all students are expected to use only their own iClickers for in-class quizzes.

Harassment and Discrimination:

The University of Delaware works to promote an academic and work environment that is free from all forms of discrimination, including harassment. As a member of the community, your rights, resource and responsibilities are reflected in the non-discrimination and sexual misconduct policies. Please familiarize yourself with these policies at www.udel.edu/oei . You can report any concerns to the University's Office of Equity & Inclusion, at 305 Hullihen Hall, (302) 831-8063 or you can report anonymously through UD Police (302) 831-2222 or the EthicsPoint Compliance Hotline at www1.udel.edu/compliance. You can also report any violation of UD policy on harassment, discrimination, or abuse of any person at this site: sites.udel.edu/sexualmisconduct/how-to-report/

Faculty Statement on Disclosures of Instances of Sexual Misconduct:

If, at any time during this course, the instructor is made aware that a student may have been the victim of sexual misconduct (including sexual harassment, sexual violence, domestic/dating violence, or stalking), then he is obligated to inform the university's Title IX Coordinator. The university needs to know information about such incidents in order to offer resources to victims and to ensure a safe campus environment for everyone. The Title IX Coordinator will decide if the incident should be examined further. If such a situation is disclosed to the instructor in class, in a paper assignment, or in office hours, your privacy will be protected—the instructor will not disclose the incident to anyone but the Title IX Coordinator. For more information on Sexual Misconduct policies, where to get help, and how to reporting information, please refer to www.udel.edu/sexualmisconduct. At UD, we provide 24-hour crisis assistance and victim advocacy and counseling. Contact 302-831-1001, UD Helpline 24/7/365, to get in touch with a sexual offense support advocate.

For information on various places you can turn for help, more information on Sexual Misconduct policies, where to get help, and reporting information please refer to www.udel.edu/sexualmisconduct

Non-Discrimination:

The University of Delaware does not discriminate against any person on the basis of race, color, national origin, sex, gender identity or expression, sexual orientation, genetic information, marital status, disability, religion, age, veteran status or any other characteristic protected by applicable law in its

employment, educational programs and activities, admissions policies, and scholarship and loan programs as required by Title IX of the Educational Amendments of 1972, the Americans with Disabilities Act of 1990, Section 504 of the Rehabilitation Act of 1973, Title VII of the Civil Rights Act of 1964, and other applicable statutes and University policies. The University of Delaware also prohibits unlawful harassment including sexual harassment and sexual violence.

For inquiries or complaints related to non-discrimination policies, please contact:

Director, Institutional Equity & Title IX Coordinator- Susan L. Groff, Ed.D. groff@udel.edu, 305 Hullihen Hall Newark, DE 19716 (302) 831-8063

For complaints related to Section 504 of the Rehabilitation Act of 1973 and/or the Americans with Disabilities Act, please contact: Director, Office of Disability Support Services, Anne L. Jannarone, M.Ed., Ed.S. - ajannaro@udel.edu, Alison Hall, Suite 130, Newark, DE 19716 (302) 831-4643 OR contact the U.S. Department of Education - Office for Civil Rights (wdcrobcolp01.ed.gov/CFAPPS/OCR/contactus.cfm)

Absences on religious holidays not listed in University calendars, as well as absences due to athletic participation or other extracurricular activities in which students are official representatives of the University, shall be recognized as excused absences when the student informs the instructor in writing during the first two weeks of the semester of these planned absences for the semester.

Schedule: (subject to change as the semester progresses)

Date	**Topic**	**Assigned readings**
Aug. 27	Course policies and general introduction	(review the course syllabus)
Aug. 29	Organization of the nervous system	Bolte-Taylor Ch. 2
Sep. 3	Types of cells and action potentials	Ju Ch. 1.2
Sep. 5	Action potentials and synaptic transmission	Ju Ch. 1.2
Sep. 10	Synaptic transmission	Ju Ch. 1.2
Sep. 12	Zombie neuroscience, safety training, review	V&V Ch. 1
Sep. 17	Lab 1 – general anatomy (sheep)	
Sep. 19	**Exam 1**	
Sep. 24	Sleep	V&V Ch. 2
Sep. 26	Movement	V&V Ch. 3
Oct. 1	Lab 2 – motor systems	
Oct. 3	Autonomic nervous system & ingestive behavior	V&V Ch. 4
Oct. 8	Motivation	Bear et al. Ch. 16, Kandel Ch. 9

Oct. 10	Lab 3 – diencephalon and brainstem	
Oct. 15	Emotion	V&V Ch. 5
Oct. 17	Language	V&V Ch. 6
Oct. 22	**Exam 2**	
Oct. 24	Lab 4 - cortex	
Oct. 29	Introduction to sensory systems, vision	V&V Ch. 7
Oct. 31	Vision, hearing	V&V Ch. 8, Ju Ch. 1.4
Nov. 5	Lab 5 – sensory systems	
Nov. 8	Somatosensation, chemical senses	Ju Ch. 1.4
Nov. 12	Learning and memory	V&V Ch. 10
Nov. 14	Lab 6 - review	
Nov. 19	Lab 7 - practical	
Nov. 21	Consciousness	V&V Ch. 9
Nov. 26	No class - Thanksgiving	
Nov. 28	No class - Thanksgiving	
Dec. 3	Individual presentations pt. 1	
Dec. 5	Individual presentations pt. 2, review	
Dec. 11	**Exam 3 (Final exam)**	

Books for assigned readings:

Official course textbook (should be purchased): V&V = "Do Zombies Dream of Undead Sheep?: A Neuroscientific View of the Zombie Brain", by Timothy Verstynen and Bradley Voytek (ISBN = 978-0691157283)

Supplementary readings (will be posted to Canvas):

Bolte-Taylor = "My Stroke of Insight: A Brain Scientist's Personal Journey", by Jill Bolte-Taylor

Ju = "Neuroscience (Canadian first edition open source textbook)", by William Ju (available at http://neuroscience.openetext.utoronto.ca/

Bear et al. = "Neuroscience: Exploring the Brain (4th edition)", by Mark Bear, Barry Connors, and Michael Paradiso

Kandel = "The Disordered Mind: What Unusual Brains Tell Us About Ourselves", by Eric Kandel