COURSE SYLLABUS NSCS 200 Online Fall 2024

Course Title and Number

Fundamentals of Neuroscience and Cognitive Science (NSCS 200)

Description of Course

Fundamental concepts in the development, evolution, organization and function of neural circuits underlying cognition and behavior, including biological, ethological, computational and psychological perspectives. This course will provide an introduction to the principles of neuroanatomy, neurophysiology and cognitive science. Topics will be addressed with material from philosophy, psychology, computer science and neuroscience and will incorporate data from work with animals and humans.

Locations and Times

D2l.arizona.edu

Instructor Information

Sarah Cook, PhD

E-mail address: sarahcook@arizona.edu
Virtual Office hours via Zoom: by appointment

Richard B. Levine, PhD

E-mail address: rbl4@arizona.edu
Virtual Office hours via Zoom: by appointment

Course Website: All information about the course, including the syllabus, additional reading materials and lecture slides will be available on the D2L website. It is your responsibility to check the course website regularly for announcements and other important course information.

Course format

This course will be taught using the D2L Online format. Lecture videos and assignments will be available on D2L

Course Objectives and Expected Learning Outcomes

This course is intended to provide a rigorous introduction to topics fundamental to modern brain and cognitive science. Topics range from the cellular and molecular principles necessary to understand normal brain function and clinical disorders, to the approaches of cognitive science that provide a clearer understanding of complex human behavior. This course serves as the initial required course for the Neuroscience and Cognitive Science (NSCS) undergraduate major.

Learning Outcomes:

Upon completion of this course, students should be able to:

1) Describe the general organization of the brain and its relation to physiological and cognitive processes. Explain the fundamental principles of anatomical and functional organization of neuronal circuits and networks underlying the complex capacities of the mind. (NSCS Program Learning Objective A1)
2) Explain, including diagrams, the basic molecular and cellular mechanisms underlying neural excitability and synaptic physiology and predict the consequences of disrupting various elements of the underlying mechanisms. (A2)
3) List and explain several common principles of sensory processing across modalities, describe the basic features of the motor system, and explain how sensory-motor signaling operates. (A3)
4) Summarize contemporary understanding of the biological bases of and the cognitive processes underlying behavior, including sensation, perception, language, learning, and memory. (A6)
5) Describe the basic cognitive processes and primary circuitry involved in language, decision- making, thinking/reasoning, motivation, emotion, and consciousness. Give examples of normal range of cognitive, emotional and behavioral variability over the lifespan. (A7)
6) Outline evolutionary principles that support use of animal model systems and explain how innate/genetic factors and environment/experience are understood to interact in development. (A8)
7) List the basic steps in establishing the wiring plan of the nervous system, including common molecular signaling pathways. Differentiate activity-independent and -dependent steps. (A9)
8) Describe the cognitive, genetic, molecular, and cellular bases of several common diseases and disorders of the nervous system. Discriminate among these disorders in terms of their presentation and include the clinical tools typically used in diagnosis. (A10).

9) At a fundamental level, explain the common methodologies and experimental designs used in research in neuroscience and cognitive science. Evaluate the soundness of the methodological design of descriptive, correlational, and experimental research. Design, interpret, and evaluate simple cognitive, behavioral, and cellular experiments. (A11)

Prerequisites

Completed MCB 181 or PSIO 201 or 202 (additional prerequisites required for entry into the NSCS major).

Honors Credit

There is no honors credit offered for this course.

Course Communications

Announcements will be posted on D2L. Students are responsible for staying up-to-date on these announcements. We may also email students to reinforce some announcements.

Textbooks and other Readings

There is no required textbook to purchase for this course, but students are encouraged to read relevant chapters and readings posted to D2L. Tests will be based entirely on content presented in the lectures. Lecture slides will be posted on the D2L site, and students should take careful lecture notes. For further review, students can also reference two additional textbooks available online and through the UA library:

1) Ward, J. (2015). *The Student's Guide to Cognitive Neuroscience.* (3rd ed.) London: Psychology Press.
2) Henley, Casey (2021) Foundations of Neuroscience, Michigan State Univ. Press

For students wishing to delve deeper into topics we cover in lectures, we also highly recommend the following textbooks which we occasionally draw from in lectures

1) Bear MF, Connors BW and Paradiso MA, *Neuroscience Exploring the Brain,* 3rd-4th edition, Wolters Kluwer
2) Watson, NV and Breedlove MC, *The Mind's Machine, Foundations of Brain and Behavior,* 2nd ed. Sinauer Associates, Inc.
3) Goldstein B, *Cognitive Psychology: Connecting Mind, Research, and Everyday Experience*" 4th Edition. Cengage Learning

A useful website for enhancing your understanding of cellular neurophysiology using simulations (resting membrane potentials, action potentials) may be found at this free neuroscience online resource:
https://nba.uth.tmc.edu/neuroscience/
General JOVE videos: https://www.jove.com/science-education-library/5/neuroscience
Primary publications and website suggestions related to the lectures will be available on the D2L course site.

Lecture Schedule Overview (note that "weeks" may vary in length due to holidays and content. Please see "week" start and end dates on the D2l site.)

Week 1
Course Overview
Cell Biology of the Nervous System
Ionic Currents and Membrane Potentials
Resting Membrane Potential

Week 2
Action Potential Overview
Action Potential Mechanisms

Exam I
Introduction to Cognitive Science and Methods
Consciousness

Week 3
Awareness
Attention

Exam II
Synaptic Transmission Overview
Synaptic Transmission Mechanisms and Integration

Week 4
Anatomy of the Spinal Cord and Brain
Sensory Transduction and Neural Pathways in Touch and Audition
Sensory Transduction and Neural Pathways in Vision

Exam III

Week 5
Higher Processing of Vision & Hearing
Motor Cortex, Cerebellum, Basal Nuclei and Brainstem
Neuromuscular Function and Central Pattern Generators Disorders of the Motor System

Exam IV

Week 6

Memory: Types

Cellular Basis of Learning
Memory: Learning
Emotion
Concepts
Language

Exam V

Week 7/8
Executive Function
Working Memory
Decision Making
Cellular Development of the Nervous System
Cognitive Development

Exam VI

Grading Policy:

Exams (6)	50 points each = 300 points
Discussion Assignments (4)	15 points each = 60 points
Special Project: Essay	100 points
Questions during lecture videos	40 points
Total	**500 Possible Points**

Final Course Grade Assignments:

A	90-100%
B	80-89%
C	70-79%
D	60-69%
E	below 60%

http://catalog.arizona.edu/policy/grades-and-grading-system

Requests for incompletes (I) and withdrawal (W) must be made in accordance with University policies which are available at:
https://catalog.arizona.edu/policy/grades-and-grading-system#Withdrawal

Discussion Activities

During the semester we assign individual or group discussion activities for further engagement with material covered in lectures. The discussion assignment posted on D2L will detail requirements and uploading directions. Students will receive 15 points per assignment with points recorded via D2L.

Special Project: Essay

Students are required to complete an essay assignment that will cover both Neuroscience and Cognitive Science perspectives on a course topic. Detailed instructions and the grading rubric are provided on the course D2L site.

Online Meetings

During the semester, students may schedule online meetings with the instructors to ask questions or discuss the course material. Instructors will also offer times for group meetings prior to each examination. Students are welcome to schedule meetings.

Absence and Class Participation Policy:

Attendance records will not be collected. Watching the recorded lectures is considered essential for satisfactory understanding of the material. Many lectures will have graded or non-graded quiz questions, and there are graded discussion questions associated with required readings. Videos or readings that are not required will be labeled as "optional", and are intended as a supplement for students wishing to explore interesting research or perspectives on the topic.

Although the timing of your viewing and completing online course activities is flexible, we recognize that unforeseen circumstances may arise. Please notify the instructors if you face difficulties completing the online activities. As per UA class absence practices, adhere to the following requirements:

- Students who need to miss a class, or series of classes, due to illness or the need to

quarantine/isolate are responsible for emailing their course instructor, with a copy to the **Dean of Students**, to let them know of the need, as soon as possible. There is no need for a medical excuse to be provided for absence of **up to one week** (see more below).

- Students are responsible for completing any work that they might miss due to illness or the need to quarantine/isolate, including assignments, quizzes, tests and exams.
- Non-attendance for any reason does not guarantee an automatic extension of due date or rescheduling of examinations. Students are responsible for communicating with their instructor(s) via the means of communication established by the instructor(s), e.g., via D2L, email, text message, etc.
- Students who need to miss **more than one week of classes in any one semester** will be required to provide a doctor's note of explanation to the **Dean of Students**. The Dean of Students Office will communicate the receipt of the note (with expected end date) out to the relevant faculty, and instructors are responsible for determining adjustments or modifications as appropriate.
- Visit the UArizona COVID-19 page for regular updates: https://covid19.arizona.edu/ For information on asymptomatic testing, refer to this link: https://covid19.arizona.edu/covid19- testing. If you are experiencing symptoms, follow the instructions for quarantining (https://health.arizona.edu/fall2020) and for testing, call Campus Health to schedule an appointment. https://health.arizona.edu/ (520) 621-9202.

Make up exams will only be allowed in cases of a Dean's excuse or emergencies, with advanced approval of instructors. The make-up exam may involve additional components, such as additional questions and/or an oral component. If you anticipate being absent, are unexpectedly absent, or are unable to participate in class online activities, please contact us as soon as possible as per the policies above.

To request a disability-related accommodation to this attendance policy, please contact the Disability Resource Center at (520) 621-3268 or drc-info@email.arizona.edu. If you are experiencing unexpected barriers to your success in your courses, the Dean of Students Office is a central support resource for all students and may be helpful. The Dean of Students Office is located in the Robert L. Nugent Building, room 100, or call 520-621-7057.

Assignments:

Number of required exams: 6

Number of Discussion Assignments: 4

Special Project: Essay: 1
Readings: optional textbooks; selected chapters/articles provided on D2L
Required extracurricular activities: None

Online Classroom Behavior Policy:

To foster a positive learning environment, students and instructors have a shared responsibility. We want a safe, welcoming, and inclusive environment where all of us feel comfortable with each other and where we can challenge ourselves to succeed. To that end, our focus is on the tasks at hand. The UA Threatening Behavior by Students Policy prohibits threats of physical harm to any member of the University community, including to oneself. See https://policy.arizona.edu/education-and-student-affairs/threatening-behavior-students

Statement of Copyrighted Materials:

Students are advised that all course materials disseminated by the instructor to the students, whether in-class or online (i.e. D2L), are original materials and as such, reflect intellectual property of the instructor or author of those works. Any notes and handouts are intended for individual use by the student. Selling class notes and/or other course materials to other students or to a third party for resale is not permitted without the instructor's express written consent. Violations to this and other course rules are subject to the Code of Academic Integrity and may result in course sanctions. Additionally, students who use D2L or UA e-mail to sell or buy these copyrighted materials are subject to Code of Conduct Violations for misuse of student e-mail addresses. This conduct may also constitute copyright infringement.

Class Recordings: Students may not modify content or re-use content for any purpose other than personal educational reasons. All recordings are subject to government and university regulations. Therefore, students accessing unauthorized recordings or using them in a manner inconsistent with UA's values and educational policies are subject to suspension or civil action.

Accessibility and Accommodations:
At the University of Arizona, we strive to make learning experiences as accessible as possible. If you anticipate or experience barriers based on disability or pregnancy, please contact the Disability Resource Center (520-621-3268, https://drc.arizona.edu/) to establish reasonable accommodations.
*****Please be sure to reach out to the instructors if the circumstances of the COVID-19 quarantine will make it difficult for you to complete assignments and exams so we can discuss other arrangements.*

Code of Academic Integrity:
Students are encouraged to share intellectual views and discuss freely the principles and applications of course materials. However, graded work/exercises must be the product of independent effort unless otherwise instructed. Students are expected to adhere to the UA Code of Academic Integrity as described in the UA General Catalog. See: http://deanofstudents.arizona.edu/academic-integrity/students/academic-integrity

Commitment to Diversity, Inclusion and Respect:
Diversity and Inclusion
Diversity unites and moves us forward. The diverse backgrounds, experiences and perspectives that each student brings to this class will be viewed as a resource, strength, and benefit. In this class, we have a unique and important opportunity to learn from the information and ideas shared by each other, and we also a responsibility to do so with sensitivity and respect.

Ideally, science would be objective. However, as you will learn, much of science is subjective and is historically built on a small subset of privileged voices. It is important to make note of this and to think about how significant research findings may be biased by their nature of being carried out on a typically small, non-representative sample of participants.

We would like to create a learning environment for my students that honors diverse identities (including race, ethnicity, gender, age, class, sexuality, nationality, religion, ability, etc.), and supports a diversity of experiences, thoughts, and perspectives. To learn more about the UA's commitment to diversity, and inclusion, please visit https://diversity.arizona.edu/. The University is also committed to creating and maintaining an environment free of discrimination; see https://policy.arizona.edu/human-resources/nondiscrimination-and-anti-harassment-policy.

Our online classroom is a place where everyone is encouraged to express well-formed opinions and their reasons for those opinions. We also want to create a tolerant and open environment where such opinions can be expressed without resorting to bullying or discrimination of others.

Preferred Name and Gender Pronouns

This course affirms people of all gender expressions and gender identities. The university recognizes that many members of its community use names other than their legal or official names first provided to the university (official/legal name) to identify themselves. For some, a chosen or preferred name may be an important component of their identity, especially their gender identity.

If you would prefer that a different name from your legal one or the one that appears on the class roster be used, the university has established guidelines that allow students and employees to indicate their chosen or preferred first names. A student or employee's preferred name will appear instead of the person's official/legal name in select university-related systems and documents (e.g. D2L, official email display name, UAccess, etc.), provided that the preferred first name is not being used for the purpose of misrepresentation. Please see the following link for more information:**http://lgbtq.arizona.edu/use-chosen-or-preferred-names**
We want to be sure that we refer to you in your preferred way. If you prefer a name other than the one on our class roster, please let us know. If you have certain pronouns that you particularly want us to use, please include them when you sign your email. We will try our best to remember your preferred names and pronouns, but please also feel free to give us a reminder. Also, students are able to update and edit their pronouns in UAccess. To change your listed pronoun on UAccess, navigate to the Student Self Service page, go to the personal information section, and click on "Names". Options include (he, him, his), (she, her, hers), (they, them, theirs), (xe, xem, xyr), and (ze, zir).

Land Acknowledgement

We respectfully acknowledge the University of Arizona is on the land and territories of Indigenous peoples. Today, Arizona is home to 22 federally recognized tribes, with Tucson being home to the O'odham and the Yaqui. Committed to diversity and inclusion, the University strives to build sustainable relationships with sovereign Native Nations and Indigenous communities through education offerings, partnerships, and community service.

Additional Resources for Students:

UA Academic policies and procedures are available at:
https://academicaffairs.arizona.edu/syllabus-policies.

Confidentiality of Student Records:

http://www.registrar.arizona.edu/personal-information/family-educational-rights-and-privacy-act-1974-ferpa?topic=ferpa

Mental Health Resources:

Personal concerns such as stress, anxiety, depression, attentional difficulties, relationship difficulties, etc. can interfere with your ability to succeed and thrive at the University of Arizona. UA has assembled an excellent set of health-related resources at https://health.arizona.edu. For helpful links to mindfulness exercises, free mental health apps, mental health groups, and other

tools to help cope with stress, click on the "Support Your Mental Health" link in this webpage: https://health.arizona.edu/take-charge-your-well-being-2020.

For UA's Counseling & Psych Services (CAPS) 24/7 hotline, call (520) 621-3334. Relatedly, if you are experiencing unexpected barriers to your success in your courses, please note the Dean of Students Office is a central support resource for all students and may be helpful. http://deanofstudents.arizona.edu/student-assistance/students/student-assistance
The Dean of Students Office can be reached at 520-621-7057 or DOS-deanofstudents@email.arizona.edu. Also see https://deanofstudents.arizona.edu/

Are you in crisis? Here are some ideas about where to go or who to call:

Located in Tucson? Call the Community-Wide Crisis Line 24 hours a day, 7 days a week at 520-622-6000.

Are you a University of Arizona student? If it is not an emergency and you are a UA student, call or walk-in to Counseling and Psych Services at 520-621-3334 Monday - Friday. Walk-in triage is available between 9 am and 4 pm Monday - Friday.

Are you a concerned friend? Concerned friends can find out more about helping a friend who might be experiencing problems through our Friend 2 Friend website.

Resources for sexual assault, relationship violence, and stalking.

24- Hour Hotlines:

The National Suicide Prevention Lifeline is a 24-hour, toll-free, confidential suicide prevention hotline available to anyone in suicidal crisis or emotional distress. By dialing 1-800-273-TALK (8255), the call is routed to the nearest crisis center in our national network of more than 150 crisis centers. The Lifeline's national network of local crisis centers provides crisis counseling and mental health referrals day and night.

Crisis Text Line: Text HOME to 741741 from anywhere **in the United States**, anytime, about any type of crisis. A live, trained Crisis Counselor receives the text and responds, all from a secure online platform. Find out more about how it works at crisistextline.org.

Suicide Prevention for LGBTQ Youth through the Trevor Project:

- **The Trevor Lifeline** is a 24/7 suicide hotline: 866-4-U-TREVOR (1-866-488-7386)
- **TrevorChat:** Online instant messaging available 7 days a week, 3 pm - 10 pm ET (12 pm -- 7 pm PT)
- **TrevorText:** Confidential and secure resource that provides live help for LGBTQ youth with a trained specialist, over text messages. Text TREVOR to 1-202-304-1200 (available 7 days a week, 3 pm - 10 pm ET, 12 pm -- 7 pm PT)

Veterans' Suicide Prevention Lifeline: 1-800-273-TALK (1-800-273-8255)

SAMHSA Treatment Referral Hotline (Substance Abuse): 1-800-662-HELP (1-800-662-4357)

National Sexual Assault Hotline: 1-800-656-HOPE (1-800-656-4673)

Loveisrespect (National Dating Abuse Helpline): Call 1-866-331-9474 (TTY: 1-866-331-8453). Text LOVEIS to 22522 - you'll receive a response from a peer advocate prompting you for your question. Go ahead and text your comment or question and we will reply.

Survivor Advocacy Program: Call 520-621-5767 or email survivoradvocacy@email.arizona.edu. The Survivor Advocacy Program provides confidential support and advocacy services to student survivors of sexual and gender-based violence. The Program can also advise students about relevant non-UA resources available within the local community for support. https://survivoradvocacy.arizona.edu/

Subject to Change Statement:

Information contained in the course syllabus, other than the grade and absence policy, may be subject to change with advance notice, as deemed appropriate by the instructor.

COURSE SYLLABUS NSCS 200 Online Spring 2024

Course Title and Number

Fundamentals of Neuroscience and Cognitive Science (NSCS 200)

Description of Course

Fundamental concepts in the development, evolution, organization and function of neural circuits underlying cognition and behavior, including biological, ethological, computational and psychological perspectives. This course will provide an introduction to the principles of neuroanatomy, neurophysiology and cognitive science. Topics will be addressed with material from philosophy, psychology, computer science and neuroscience and will incorporate data from work with animals and humans.

Locations and Times

D2l.arizona.edu

Instructor Information

Richard B. Levine. PhD

E-mail address: rbl4@arizona.edu
Virtual Office hours via Zoom: by appointment

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Learning Outcomes:

Upon completion of this course, students should be able to:

1) Describe the general organization of the brain and its relation to physiological and cognitive processes. Explain the fundamental principles of anatomical and functional organization of neuronal circuits and networks underlying the complex capacities of the mind. (NSCS Program Learning Objective A1)
2) Explain, including diagrams, the basic molecular and cellular mechanisms underlying

neural excitability and synaptic physiology and predict the consequences of disrupting various elements of the underlying mechanisms. (A2)

3) List and explain several common principles of sensory processing across modalities, describe the basic features of the motor system, and explain how sensory-motor signaling operates. (A3)
4) Summarize contemporary understanding of the biological bases of and the cognitive processes underlying behavior, including sensation, perception, language, learning, and memory. (A6)
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7) List the basic steps in establishing the wiring plan of the nervous system, including common molecular signaling pathways. Differentiate activity-independent and -dependent steps. (A9)
8) Describe the cognitive, genetic, molecular, and cellular bases of several common diseases and disorders of the nervous system. Discriminate among these disorders in terms of their presentation and include the clinical tools typically used in diagnosis. (A10).

9) At a fundamental level, explain the common methodologies and experimental designs used in research in neuroscience and cognitive science. Evaluate the soundness of the methodological design of descriptive, correlational, and experimental research. Design, interpret, and evaluate simple cognitive, behavioral, and cellular experiments. (A11)

Prerequisites

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Honors Credit

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Grading Policy:

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Assignments:

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Number of Discussion Assignments: 4

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Required extracurricular activities: None

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To foster a positive learning environment, students and instructors have a shared responsibility. We want a safe, welcoming, and inclusive environment where all of us feel comfortable with each other and where we can challenge ourselves to succeed. To that end, our focus is on the tasks at hand. The UA Threatening Behavior by Students Policy prohibits threats of physical harm to any member of the University community, including to oneself. See https://policy.arizona.edu/education-and-student-affairs/threatening-behavior-students

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Students are advised that all course materials disseminated by the instructor to the students, whether in-class or online (i.e. D2L), are original materials and as such, reflect intellectual property of the instructor or author of those works. Any notes and handouts are intended for individual use by the student. Selling class notes and/or other course materials to other students or to a third party for resale is not permitted without the instructor's express written consent. Violations to this and other course rules are subject to the Code of Academic Integrity and may result in course sanctions. Additionally, students who use D2L or UA e-mail to sell or buy these copyrighted materials are subject to Code of Conduct Violations for misuse of student e-mail addresses. This conduct may also constitute copyright infringement.

Class Recordings: Students may not modify content or re-use content for any purpose other than personal educational reasons. All recordings are subject to government and university regulations. Therefore, students accessing unauthorized recordings or using them in a manner inconsistent with UA's values and educational policies are subject to suspension or civil action.

Accessibility and Accommodations:
At the University of Arizona, we strive to make learning experiences as accessible as possible. If you anticipate or experience barriers based on disability or pregnancy, please contact the Disability Resource Center (520-621-3268, https://drc.arizona.edu/) to establish reasonable accommodations.
*****Please be sure to reach out to the instructors if the circumstances of the COVID-19 quarantine will make it difficult for you to complete assignments and exams so we can discuss other arrangements.*

Code of Academic Integrity:
Students are encouraged to share intellectual views and discuss freely the principles and applications of course materials. However, graded work/exercises must be the product of independent effort unless otherwise instructed. Students are expected to adhere to the UA Code of Academic Integrity as described in the UA General Catalog. See: http://deanofstudents.arizona.edu/academic-integrity/students/academic-integrity

Commitment to Diversity, Inclusion and Respect:
Diversity and Inclusion
Diversity unites and moves us forward. The diverse backgrounds, experiences and perspectives that each student brings to this class will be viewed as a resource, strength, and benefit. In this class, we have a unique and important opportunity to learn from the information and ideas shared by each other, and we also a responsibility to do so with sensitivity and respect.

Ideally, science would be objective. However, as you will learn, much of science is subjective and is historically built on a small subset of privileged voices. It is important to make note of this and to think about how significant research findings may be biased by their nature of being carried out on a typically small, non-representative sample of participants.

We would like to create a learning environment for my students that honors diverse identities (including race, ethnicity, gender, age, class, sexuality, nationality, religion, ability, etc.), and supports a diversity of experiences, thoughts, and perspectives. To learn more about the UA's commitment to diversity, and inclusion, please visit https://diversity.arizona.edu/. The University is also committed to creating and maintaining an environment free of discrimination; see https://policy.arizona.edu/human-resources/nondiscrimination-and-anti-harassment-policy.

Our online classroom is a place where everyone is encouraged to express well-formed opinions and their reasons for those opinions. We also want to create a tolerant and open environment where such opinions can be expressed without resorting to bullying or discrimination of others.

Preferred Name and Gender Pronouns

This course affirms people of all gender expressions and gender identities. The university recognizes that many members of its community use names other than their legal or official names first provided to the university (official/legal name) to identify themselves. For some, a chosen or preferred name may be an important component of their identity, especially their gender identity.

If you would prefer that a different name from your legal one or the one that appears on the class roster be used, the university has established guidelines that allow students and employees to indicate their chosen or preferred first names. A student or employee's preferred name will appear instead of the person's official/legal name in select university-related systems and documents (e.g. D2L, official email display name, UAccess, etc.), provided that the preferred first name is not being used for the purpose of misrepresentation. Please see the following link for more information:**http://lgbtq.arizona.edu/use-chosen-or-preferred-names**
We want to be sure that we refer to you in your preferred way. If you prefer a name other than the one on our class roster, please let us know. If you have certain pronouns that you particularly want us to use, please include them when you sign your email. We will try our best to remember your preferred names and pronouns, but please also feel free to give us a reminder. Also, students are able to update and edit their pronouns in UAccess. To change your listed pronoun on UAccess, navigate to the Student Self Service page, go to the personal information section, and click on "Names". Options include (he, him, his), (she, her, hers), (they, them, theirs), (xe, xem, xyr), and (ze, zir).

Land Acknowledgement

We respectfully acknowledge the University of Arizona is on the land and territories of Indigenous peoples. Today, Arizona is home to 22 federally recognized tribes, with Tucson being home to the O'odham and the Yaqui. Committed to diversity and inclusion, the University strives to build sustainable relationships with sovereign Native Nations and Indigenous communities through education offerings, partnerships, and community service.

Additional Resources for Students:

UA Academic policies and procedures are available at:
https://academicaffairs.arizona.edu/syllabus-policies.

Confidentiality of Student Records:

http://www.registrar.arizona.edu/personal-information/family-educational-rights-and-privacy-act-1974-ferpa?topic=ferpa

Mental Health Resources:

Personal concerns such as stress, anxiety, depression, attentional difficulties, relationship difficulties, etc. can interfere with your ability to succeed and thrive at the University of Arizona. UA has assembled an excellent set of health-related resources at https://health.arizona.edu. For helpful links to mindfulness exercises, free mental health apps, mental health groups, and other

tools to help cope with stress, click on the "Support Your Mental Health" link in this webpage: https://health.arizona.edu/take-charge-your-well-being-2020.

For UA's Counseling & Psych Services (CAPS) 24/7 hotline, call (520) 621-3334. Relatedly, if you are experiencing unexpected barriers to your success in your courses, please note the Dean of Students Office is a central support resource for all students and may be helpful. http://deanofstudents.arizona.edu/student-assistance/students/student-assistance
The Dean of Students Office can be reached at 520-621-7057 or DOS-deanofstudents@email.arizona.edu. Also see https://deanofstudents.arizona.edu/

Are you in crisis? Here are some ideas about where to go or who to call:

Located in Tucson? Call the Community-Wide Crisis Line 24 hours a day, 7 days a week at 520-622-6000.

Are you a University of Arizona student? If it is not an emergency and you are a UA student, call or walk-in to Counseling and Psych Services at 520-621-3334 Monday - Friday. Walk-in triage is available between 9 am and 4 pm Monday - Friday.

Are you a concerned friend? Concerned friends can find out more about helping a friend who might be experiencing problems through our Friend 2 Friend website.

Resources for sexual assault, relationship violence, and stalking.

24- Hour Hotlines:

The National Suicide Prevention Lifeline is a 24-hour, toll-free, confidential suicide prevention hotline available to anyone in suicidal crisis or emotional distress. By dialing 1-800-273-TALK (8255), the call is routed to the nearest crisis center in our national network of more than 150 crisis centers. The Lifeline's national network of local crisis centers provides crisis counseling and mental health referrals day and night.

Crisis Text Line: Text HOME to 741741 from anywhere **in the United States**, anytime, about any type of crisis. A live, trained Crisis Counselor receives the text and responds, all from a secure online platform. Find out more about how it works at crisistextline.org.

Suicide Prevention for LGBTQ Youth through the Trevor Project:

- **The Trevor Lifeline** is a 24/7 suicide hotline: 866-4-U-TREVOR (1-866-488-7386)
- **TrevorChat:** Online instant messaging available 7 days a week, 3 pm - 10 pm ET (12 pm -- 7 pm PT)
- **TrevorText:** Confidential and secure resource that provides live help for LGBTQ youth with a trained specialist, over text messages. Text TREVOR to 1-202-304-1200 (available 7 days a week, 3 pm - 10 pm ET, 12 pm -- 7 pm PT)

Veterans' Suicide Prevention Lifeline: 1-800-273-TALK (1-800-273-8255)

SAMHSA Treatment Referral Hotline (Substance Abuse): 1-800-662-HELP (1-800-662-4357)

National Sexual Assault Hotline: 1-800-656-HOPE (1-800-656-4673)

Loveisrespect (National Dating Abuse Helpline): Call 1-866-331-9474 (TTY: 1-866-331-8453). Text LOVEIS to 22522 - you'll receive a response from a peer advocate prompting you for your question. Go ahead and text your comment or question and we will reply.

Survivor Advocacy Program: Call 520-621-5767 or email survivoradvocacy@email.arizona.edu. The Survivor Advocacy Program provides confidential support and advocacy services to student survivors of sexual and gender-based violence. The Program can also advise students about relevant non-UA resources available within the local community for support. https://survivoradvocacy.arizona.edu/

Subject to Change Statement:

Information contained in the course syllabus, other than the grade and absence policy, may be subject to change with advance notice, as deemed appropriate by the instructor.

COURSE SYLLABUS

Arizona Online: Cellular Neurophysiology NROS 307

Description of Course
Fundamental concepts, and the underlying experimental evidence, of cellular neurobiology, including: the structure and biophysical properties of membranes on nerve cells, glia, and muscle cells; the biophysical, molecular and physiological mechanisms underlying information processing and signaling by nerve cells and synapses; and the organization and functioning of neural circuits to form nervous systems.

Time of Classes
Online, Asynchronous

Teaching Format
Pre-recorded video lectures accompanied by powerpoint slides (no live lectures).

Instructor:
Dr, Julie E. Miller, Associate Professor, Department of Neuroscience and Speech, Language & Hearing Sciences
juliemiller@arizona.edu
Office Hours: by appointment (zoom)

Preceptor:
Leah Barnhardt: leahbarnhardt@arizona.edu
Office Hours: by appointment (zoom)

Course Website
All information about the course, including the syllabus, additional reading materials, lecture slides, and homework assignments, will be posted at the course's D2L Website. It is the student's responsibility to check that Website regularly to check for announcements and other important course information.

Course Objectives:
This course focuses on a study of the molecular, biophysical, and neurophysiological mechanisms underlying the generation and propagation of signals within and between neurons and glial cells as well as effector (muscle and gland) cells. The properties of individual neurons will be examined first, followed by a study of how these cells function in circuits. The course will emphasize the importance of experimental data critical thinking, and the use of model systems to understand the functions of cells in and controlled by the nervous system.

Expected Learning Outcomes:
At the completion of this course students were expected to understand:

- the roles of ion channels and other membrane components in generating resting, action, and synaptic potentials
- the properties of different types of ion channels and how those properties can be used to change signaling within neurons
- the mechanisms of neurotransmission at synapses.
- the mechanisms of synaptic integration
- the mechanisms of synaptic plasticity
- interactions between neurons and glial cells and between neurons and effector cells
- neural circuits supporting the functions of visual system.

NSCS Learning Objectives. This course contributes to the following learning objectives for the NSCS major (see NSCS website for more details): 3A1, 4A2, 5A2, 17A6, 21A10, 22A10, 36NS12, 37NS12, 38NS13, 39NS13, and 47NS18.

Prerequisites: MCB181R & ECOL182, CHEM 151/152 with labs (or by permission of the instructor).

Recommended Textbook and Other Readings
Principles of Neuroscience. Kandel et al. (Sixth Edition). ISBN: 978-1259642234
Other readings will be available from the D2L Website.

Grading

A	90-100%
B	80-89%
C	70-79%
D	60-69%
E	below 60%

https://catalog.arizona.edu/

Regular grades are awarded for this course: ABCDE. Please note that grades cannot be negotiated as that would not be fair to the entire class. Any final numerical grades at 0.5 decimal points or less from a new letter grade will be rounded up. For example, an 89.5 will become a 90 (resulting in an A).

Discussions: There will be a discussion activity (Discussions tab) due on three Mondays at 10am (3 discussions total, worth 10 points). Each discussion will emphasize course material covered through the week. Grading is not based on accuracy but for participation credit through submission of your effortful response.

In-Class Exercises: There will be in-class exercises (during the video lectures) that will be completed and turned in for credit. The lowest two exercises will be dropped. Each will be worth 10 points.

Quizzes: There will be seven quizzes (worth 100 points each) and an optional final exam. The optional final exam (100 points) will replace the lowest score on one of the weekly quizzes and will cover the material of the entire course.

The final grade for NROS 307 will be determined out of 1070 points as follows:

1. The discussions will count for 30 points (3 discussions each worth 10 points on alternating weeks)
2. The in-class exercises during the lecture recordings will count for 340 points (36 exercises, 10 points each, lowest two scores will be dropped)
3. The quizzes will count 700 points (7 quizzes, 100 points each)

Course and University Policies:

Course Website: All information about the course, including the syllabus, additional reading materials and lecture slides will be available on the D2L website. It is your responsibility to check the course website regularly for announcements and other important course information.

Attendance: Attendance is not recorded given the nature of this online course. All holidays or special events observed by organized religions will be honored for those students who show affiliation with that particular religion. Absences pre-approved by the UA Dean of Students will

be honored. Please notify your instructor if you will be missing course deadlines. Please notify your instructor if you have an emergency situation that prevents you from submitting work on time and would like to request an extension of the due date. If you must miss the equivalent of more than one week of class, you should contact the Dean of Students Office to share documentation about the challenges you are facing.

DOS-deanofstudents@email.arizona.edu

If you are experiencing unexpected barriers to your success in your courses, the Dean of Students Office is a central support resource for all students and may be helpful. The Dean of Students Office is located in the Robert L. Nugent Building, room 100, or call 520-621-7057.

Requests for incompletes (I) and withdrawal (W):

These requests must be made in accordance with University policies which are available at

https://catalog.arizona.edu/policy-type/grade-policies

Absences:

DOS-deanofstudents@email.arizona.edu to share documentation about the challenges you are facing.

The UA policy regarding absences for any sincerely held religious belief, observance or practice will be accommodated where reasonable,

https://policy.arizona.edu/human-resources/religious-accommodation-policy

Attendance Policy: Class attendance will not be graded.

Incompletes (I) and withdrawal (W):

Requests for incomplete (I) or withdrawal (W) must be made in accordance with University

policies, which are available at

http://catalog.arizona.edu/policy/grades-and-grading-system#incomplete

Absences:

Please notify your instructor if you have an emergency situation that prevents you from submitting work on time and would like to request an extension of the due date. If you must miss the equivalent of more than one week of class, you should contact the Dean of Students Office:

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The UA policy regarding absences for any sincerely held religious belief, observance or practice will be accommodated where reasonable,

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Make up exams will only be allowed in cases of a Dean's excuse or emergencies, with advanced approval of instructors. The make-up exam may involve additional components, such as additional questions and/or an oral component. If you anticipate being absent, are unexpectedly absent, or are unable to participate in class activities, please contact us as soon as possible as per the policies above.

Safety on Campus and in the Classroom:
For a list of emergency procedures for all types on incidents, please visit the website of the Critical Incident Response Team (CIRT): https://cirt.arizona.edu/case-emergency/overview (link is external).

Also watch the video available at https://arizona.sabacloud.com/Saba/Web_spf/NA7P1PRD161/common/learningeventdetail/crtfy000000000003560

UA Academic policies and procedures:

https://academicaffairs.arizona.edu/syllabus-policies

Accessibility and Accommodations:
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Student Assistance:

https://deanofstudents.arizona.edu/support/student-assistance

Academic Advising:
If you have questions about your academic progress this semester, please reach out to your academic advisor (https://advising.arizona.edu/advisors/major**). Contact the Advising Resource Center (**https://advising.arizona.edu/**) for all general advising questions and referral assistance. Call 520-626-8667 or email to** advising@arizona.edu

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See: https://deanofstudents.arizona.edu/policies/code-academic-integrity
The University Libraries have some excellent tips for avoiding plagiarism:
https://new.library.arizona.edu/research/citing/plagiarism

Selling class notes and/or other course materials to other students or to a third party for resale is not permitted without the instructor's express written consent. Violations to this and other course rules are subject to the Code of Academic Integrity and may result in course sanctions. Additionally, students who use D2L or UA email to sell or buy these copyrighted materials are subject to Code of Conduct Violations for misuse of student email addresses. This conduct may also constitute copyright infringement.

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The UA Threatening Behavior by Students Policy prohibits threats of physical harm to any member of the University community, including to oneself. See

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Nondiscrimination and Anti-Harassment Policy: The University of Arizona is committed to creating and maintaining an environment free of discrimination. In support of this commitment, the University prohibits discrimination, including harassment and retaliation, based on a protected classification, including race, color, religion, sex, national origin, age, disability, veteran status, sexual orientation, gender identity, or genetic information. For more information, including how to report a concern, please see **http://policy.arizona.edu/human-resources/nondiscrimination-and-anti-harassment-policy (link is external)**.

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https://registrar.arizona.edu/privacy-ferpa/ferpa-compliance

University-wide Policies link: http://catalog.arizona.edu/syllabus-policies

UA Academic policies and procedures:

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Land Acknowledgement: We respectfully acknowledge the University of Arizona is on the land and territories of Indigenous peoples. Today, Arizona is home to 22 federally recognized tribes, with Tucson being home to the O'odham and the Yaqui. Committed to diversity and inclusion, the University strives to build sustainable relationships with sovereign Native Nations and Indigenous communities through education offerings, partnerships, and community service. For more information about the native lands on which UArizona sits, see nasa.arizona.edu.

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We want to be sure that we refer to you in your preferred way. If you prefer a name other than the one on our class roster, please let us know. If you have certain pronouns that you want us to use, please include them when you sign your email. We will try our best to remember your preferred names and pronouns, but please also feel free to give us a reminder. Also, students are able to update and edit their pronouns in UAccess. To change your listed pronoun on UAccess, navigate to the Student Self Service page, go to the personal information section, and click on "Names". Options include (he, him, his), (she, her, hers), (they, them, theirs), (xe, xem, xyr), and (ze, zir). More information on updating your preferred name and pronouns is available on the Office of the Registrar site at https://www.registrar.arizona.edu/ and https://lgbtq.arizona.edu/students.

Additional Resources for Students:

Service Members and Veterans:

If you are a current service member or veteran reach out to the VETS center. VETS is an organization run by veterans, spouses, dependents, and current service members who, through their shared experiences, endeavor to maintain a dynamic and effective program which is responsive to the needs of the community. More information can be found at https://vets.arizona.edu.

Basic Needs Statement:

Basic needs insecurity affects 1 in 3 college students at the University of Arizona, which can impact students both inside and outside of the classroom and affect their opportunity to learn. Any student who has difficulty accessing sufficient food, clothing, and hygiene items or who lacks a safe and stable place to live and believes this may affect their performance in the course, is urged to contact the Dean of Students for support. In addition, the University of Arizona Campus Pantry is open for students to receive supplemental groceries and the Campus Closet is available for free clothing items. For all information about on-campus and off-campus resources, please visit https://asuatoday.arizona.edu/basic-needs.

Mental Health Resources:

Personal concerns such as stress, anxiety, depression, attentional difficulties, relationship difficulties, etc. can interfere with your ability to succeed and thrive at the University of Arizona. UA has assembled an excellent set of health-related resources at https://health.arizona.edu. For helpful links to mindfulness exercises, free mental health apps, mental health groups, and other tools to help cope with stress, click on the "Support Your Mental Health" link in this webpage: https://health.arizona.edu/take-charge-your-well-being-2021.

For UA's Counseling & Psych Services (CAPS) 24/7 hotline, call (520) 621-3334. Relatedly, if you are experiencing unexpected barriers to your success in your courses, please note the Dean of Students Office is a central support resource for all students and may be helpful. The Dean of Students Office's Student Assistance Program helps students manage crises, life traumas, and other barriers that impede success. The staff addresses the needs of students who experience issues related to social adjustment, academic challenges, psychological health, physical health, victimization, and relationship issues, through a variety of interventions, referrals, and follow up services. https://deanofstudents.arizona.edu/support/student-assistance

Email: DOS-deanofstudents@email.arizona.edu (link sends e-mail) Phone: 520-621-7057

Are you in crisis? Here are some ideas about where to go or who to call:

Located in Tucson? Call the Community-Wide Crisis Line 24 hours a day, 7 days a week at 520-622-6000. https://www.namisa.org/crisis-line/

Are you a University of Arizona student? If it is not an emergency and you are a UA student, call or walk-in to Counseling and Psych Services at 520-621-3334 Monday - Friday. Walk-in triage is available between 9 am and 4 pm Monday - Friday.

Are you a concerned friend? Concerned friends can find out more about helping a friend who might be experiencing problems through our Friend 2 Friend website: https://friend2friend.arizona.edu/

Resources for sexual assault, relationship violence, and stalking: The UA CAPS Oasis Sexual Assault and Trauma Services (Oasis) can be reached at 520-626-2051. https://survivorsupport.arizona.edu

24-Hour Hotlines:

The National Suicide Prevention Lifeline is a 24-hour, toll-free, confidential suicide prevention hotline available to anyone in suicidal crisis or emotional distress. By dialing 1-800-273-TALK (8255), the call is routed to the nearest crisis center in our national network of more than 150 crisis centers. The Lifeline's national network of local crisis centers provides crisis counseling and mental health referrals day and night. https://988lifeline.org/

Crisis Text Line: Text HOME to 741741 from anywhere **in the United States**, anytime, about any type of crisis. A live, trained Crisis Counselor receives the text and responds, all from a secure online platform. Find out more about how it works at https://crisistextline.org

Suicide Prevention for LGBTQ Youth through the Trevor Project (https://www.thetrevorproject.org/get-help/#sm.0000n8i5bxqvkcwf10zbfu33lvh1r)

- The Trevor Lifeline is a 24/7 suicide hotline: 866-4-U-TREVOR (1-866-488-7386)
- TrevorChat: Online instant messaging available 7 days a week, 3 pm – 10 pm ET (12 pm – 7 pm PT)
- TrevorText: Confidential and secure resource that provides live help for LGBTQ youth with a trained specialist, over text messages. Text TREVOR to 1-202-304-1200 (available 7 days a week, 3 pm – 10 pm ET, 12 pm – 7 pm PT)

Veterans' Suicide Prevention Lifeline: 1-800-273-TALK (1-800-273-8255). https://988lifeline.org/help-yourself/veterans/

SAMHSA Treatment Referral Hotline (Substance Abuse): 1-800-662-HELP (1-800-662-4357). https://www.samhsa.gov/find-help/national-helpline

National Sexual Assault Hotline: 1-800-656-HOPE (1-800-656-4673). https://ohl.rainn.org/online/

Loveisrespect (National Dating Abuse Helpline): Call 1-866-331-9474 (TTY: 1-866-331-8453). Text LOVEIS to 22522 - you'll receive a response from a peer advocate prompting you for your question. Go ahead and text your comment or question and we will reply. http://www.loveisrespect.org/

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Subject to Change Statement:

Information contained in the course syllabus, other than the grade and absence policy, may be subject to change with advance notice, as deemed appropriate by the instructor; see http://policy.arizona.edu/faculty-affairs-and-academics/course-syllabus-policy-undergraduate-template.

NROS 310 Cellular and Molecular Biology of Neurons Online

COURSE INFORMATION

Course Goals:
This course is designed to provide students with an understanding of molecular and cellular functions and structures. Emphasis will be on how macromolecules assemble and cooperate to carry out common cellular processes including classical genetics, molecular genetics, movement, signal transduction, organelle assembly, and cell division. The course will include a focus on the use and interpretation of experimental data using neurons as model cells.

Course Dates: 3/11/2024-5/13/2024

NSCS Learning Objectives. This course contributes to the following learning objectives for the NSCS major (see NSCS website for more details): NS.12, NS.13, NS.17, NS.18

Prerequisites:
Introductory biology (e.g. MCB/BIOC/EEB/MICR 181 & 182), general college chemistry, elementary quantitative reasoning and problem solving at an advanced college level. College-level courses in organic chemistry and cell biology or biochemistry are strongly recommended. NROS 307 is also strongly recommended.

Course Format:

Online, asynchronous. Every week lectures will be made available on Monday and homework will be due by Sunday 11:59. There will be an exam every other week on the content covered the previous two weeks. Exams will be open for two days (Thursday – Friday).

Instructor:
Jessica Bowersock, Ph.D
jbowersock@arizona.edu **(will reply within 48 hours M-F)**
when emailing, you MUST MUST MUST include NROS 310 in the subject line.

Required Textbook:
Molecular Biology of the Cell (6th edition)
Alberts et al. (2015) Garland Science (publisher)
ISBN: 978-0-8153-4432-2

Lectures and readings:
Lectures and reading assignments are important and required for this course. Lectures will emphasize and seek to clarify important concepts, but readings will include essential material not covered in class. You are responsible for the content of lectures and reading assignments.

Required reading assignments are drawn primarily from the required textbook.

Reading assignments are listed on the content link on D2L. Assigned materials should be read before the class with which they are associated. You are responsible for knowing and understanding the content of the readings. Attendance at lectures and timely completion of reading assignments are essential and expected of all students.

Exams: There will be four in-class examinations with no final exam. Each exam will be worth 150 points.

Study Questions: Each module is accompanied by study questions that serve to emphasize the concepts important for each module. These will be the basis of the exams for each module and will be turned in to be graded.

Playposits: Each recorded lecture is accompanied by one or more playposits. Active participation in these exercises will earn credit based on participation. Each exercise will be worth 2 points. The first 100 will count towards the final grade. Any additional exercises will count as extra credit. These should help guide your progress through the material.

The final grade for NROS 310 will be determined out of 1000 points as follows:

1. The study questions will count 200 points (25 points per module).
2. Playposits will count 200 points.
3. The four hourly exams will be worth 600 points.

Grading: To encourage you to help rather than to compete with each other, the course will be graded on a absolute scale so that if you get the following percentages of graded points, you will get the corresponding grade:

90-100% A
80-89% B
65-79% C
50-64% D
0 - 49% E

To take into account variation in the difficulty of exams from year to year, the 100% score of the exam will be set as the average of the four highest scores in the class. Grades will then be calculated according to this scale. For example, if the average of the 4 highest scores is 195 out of 200, everyone will be given an extra 5 points.

Grades of Incomplete ("I") will be awarded only at the end of the semester and not on account of disappointing performance. Students who are doing poorly in the course should drop it or withdraw (taking a grade of "W") before the UA deadlines for those actions.

Course and University Policies:
Attendance: Attendance at classes will not be recorded, but regular attendance at lectures is considered to be essential for satisfactory understanding of the course material. All holidays or special events observed by organized religions will be honored for those students who show affiliation with that particular religion. Absences pre-approved by the UA Dean of Students will be honored. A student who does not appear for a quiz or exam without an official excuse will receive a 0 for that quiz or exam. If a student misses the mid-term or final exam, a make-up exam will be allowed only in cases of well-documented emergencies, with approval of instructor. Make-up exams may be modified from the original and will be given as close to the exam date as possible.

Academic conduct: University of Arizona *Code of Academic Integrity* will be enforced. See: http://deanofstudents.arizona.edu/codeofacademicintegrity

The use of electronic devices (such as but not limited to cell phones, pagers, iPods, etc.) will not be allowed in class. Notebook computers and iPads may be used, but only for note-taking, *if permission of the instructor is granted* and only if they are used in a manner which is not distracting to other students.

The use of audio recording devices to record lectures will be allowed *if permission of the instructor is granted*.

All students are expected not to provide course materials (including lecture recordings, exams, homework, PowerPoint slides, etc.) to anyone not enrolled in the course, including student or business organizations, fraternity and sorority archives, etc.

Classroom Behavior Policy: To foster a positive learning environment, students and instructors have a shared responsibility. We want a safe, welcoming, and inclusive environment where all of us feel comfortable with each other and where we can challenge ourselves to succeed. To that end, our focus is on the tasks at hand and not on extraneous activities (e.g., texting, chatting, reading a newspaper, making phone calls, web surfing, etc.). Disabilities**:** Our goal in this classroom is that learning experiences be as accessible as possible. If you anticipate or experience physical or academic barriers based on disability, please let me know immediately so that we can discuss options. You are also welcome to contact the Disability Resource Center (520-621-3268) to establish reasonable accommodations. For additional information on the Disability Resource Center and reasonable accommodations, please visit http://drc.arizona.edu.

Threatening student behavior**:** The UA Threatening Behavior by Students Policy prohibits threats of physical harm to any member of the University community, including to oneself. See http://policy.arizona.edu/education-and-student-affairs/threatening-behavior-students.

Confidentiality of Student Records

http://www.registrar.arizona.edu/ferpa/default.htm

Faculty Ownership Rights in Lecture Notes and Course Materials

The instructors hold the copyright in their lectures, lecture slides, quizzes and exams, and other course original materials. This copyright includes student notes or summaries that substantially reflect the instructors' lectures or materials. These materials are made available only for personal use by students, and *students may not distribute or reproduce the materials for commercial purposes without the instructors' express written consent*. (This does not prevent students from sharing notes on an individual basis for personal use.) Violation of the instructors' copyright may result in course sanctions and violate the Code of Academic Integrity.

Code of Academic Integrity

Required language: Students are encouraged to share intellectual views and discuss freely the principles and applications of course materials. However, graded work/exercises must be the product of independent effort unless otherwise instructed. Students are expected to adhere to the UA Code of Academic Integrity as described in the UA General Catalog. See: http://deanofstudents.arizona.edu/codeofacademicintegrity http://deanofstudents.arizona.edu/academic-integrity/students/academic-integrity.

Recommended language: The University Libraries have some excellent tips for avoiding plagiarism, available at http://www.library.arizona.edu/help/tutorials/plagiarism/index.html.

Recommended language: *Selling class notes and/or other course materials to other students or to a third party for resale is not permitted without the instructor's express written consent*. Violations to this and other course rules are subject to the Code of Academic Integrity and may result in course sanctions. Additionally, students who use D2L or UA e-mail to sell or buy these copyrighted materials are subject to Code of Conduct Violations for misuse of student e-mail addresses. This conduct may also constitute copyright infringement.

UA Nondiscrimination and Anti-harassment Policy

The University is committed to creating and maintaining an environment free of discrimination; see http://policy.arizona.edu/human-resources/nondiscrimination-and-anti-harassment-policy Our classroom is a place where everyone is encouraged to express well-formed opinions and their reasons for those opinions. We

also want to create a tolerant and open environment where such opinions can be expressed without resorting to bullying or discrimination of others.

Subject to Change Statement:
Information contained in the course syllabus, other than the grade and absence policy, may be subject to change with advance notice, as deemed appropriate by the instructors. Any changes to the syllabus will be announced in class and posted on the D2L Website.

3/11 – 3/17	Module 1 – Molecular Genetics	M1 study guide due Sunday
3/18 – 3/24	Module 2 – Membranes & Membrane Transport	Exam 1 (Mar 21-22) M2 study guide due Sunday
3/25 – 3/31	Module 3 – Protein Targeting	M3 study guide due Sunday
4/01 – 4/07	Module 4 – Vesicle Trafficking and Protein Degradation	Exam 2 (Apr 11-12) M4 study guide due Sunday
4/08 – 4/14	Module 5 – Signal Transduction Pathways	M5 study guide due Sunday
4/15 – 4/21	Module 6 – Regulation of the Cell Cycle	Exam 3 (Apr 25-26) M6 study guide due Sunday
4/22 – 4/28	Module 7 – Cytoskeleton	M7 study guide due Sunday
4/29 - 5/5	Module 8 – Cell Adhesion Molecules and Moving Cells	Exam 4 (May 9-10) M8 study guide due Sunday

COURSE SYLLABUS

Arizona Online: NROS 308- Methods in Neuroscience

Description of Course
This course takes advantage of a neuronal modeling program to illustrate the basic physiological properties of neurons. We will also discuss common experimental methods of confirming those properties.

Time of Classes
Online, Asynchronous

Teaching Format
Pre-recorded video lectures accompanied by powerpoint slides (no live lectures).

Equipment and software requirements: For this class you will need access to a laptop or web-enabled device with webcam and microphone and regular access to reliable internet signal. We will be using VCAT to interact with software to address problem sets.

Instructor: Dr, Julie E. Miller, Associate Professor, Department of Neuroscience and Speech, Language & Hearing Sciences
juliemiller@arizona.edu
Office Hours: by appointment (zoom)
Preceptor:
Leah Barnhardt: leahbarnhardt@arizona.edu
Office Hours: by appointment (zoom)

Course Website
All information about the course will be posted at the course's D2L Website. It is the student's responsibility to check that Website regularly to check for announcements and other important course information.

Course Objectives:
At the completion of this course you are expected to understand:

- The fundamental mechanisms of neuronal excitability
- The uses and limitations of neuronal modeling
- The basics of other methods in Neuroscience.

Expected Learning Outcomes: This course contributes to the following learning objectives for the NSCS major (see NSCS website for more details): A1, A2, A11, B1-B5, and C1

Prerequisites
NSCS 200 (or by permission of the instructor)

Corequisites
NROS 307

Recommended Textbook and Other Readings
***Neurons in Action*, Version 2** by John W. Moore and Ann E. Stuart, Sinauer Associates, 2007. This is available if students want to work the simulations outside of class but is not necessary to work the problem set in class as the software is already loaded onto the VCAT system.

Grading

A	90-100%
B	80-89%
C	70-79%
D	60-69%
E	below 60%

http://catalog.arizona.edu/policy/grades-and-grading-system

Regular grades are awarded for this course: ABCDE. Please note that grades cannot be negotiated as that would not be fair to the entire class. Any final numerical grades at 0.5 decimal points or less from a new letter grade will be rounded up. For example, an 89.5 will become a 90 (resulting in an A).

Discussions: There will be a discussion activity (Discussions tab) due on three Mondays at 10am that is based on your experiences with the software and that week's problem sets (3 discussions total, worth 10 points = 30 total points). Grading is not based on accuracy but for participation credit through submission of your effortful response.

Problem Sets: There are 8 problem sets due weekly on Mondays at 10am; the lowest grade will be dropped (= 70 total points).

Thus, the final grade for NROS 308 will be determined out of 100 points (30 points + 70 points).

Course and University Policies:

Course Website: All information about the course, including the syllabus, additional reading materials and lecture slides will be available on the D2L website. It is your responsibility to check the course website regularly for announcements and other important course information.

Attendance: Attendance is not recorded given the nature of this online course. All holidays or special events observed by organized religions will be honored for those students who show affiliation with that particular religion. Absences pre-approved by the UA Dean of Students will be honored. Please notify your instructor if you will be missing course deadlines and if you have an emergency situation that prevents you from submitting work on time and would like to request an extension of the due date. If you must miss the equivalent of more than one week of class, you should contact the Dean of Students Office to share documentation about the challenges you are facing.

DOS-deanofstudents@email.arizona.edu

If you are experiencing unexpected barriers to your success in your courses, the Dean of Students Office is a central support resource for all students and may be helpful. The Dean of Students Office is located in the Robert L. Nugent Building, room 100, or call 520-621-7057.

Requests for incompletes (I) and withdrawal (W):

These requests must be made in accordance with University policies which are available at

https://catalog.arizona.edu/policy-type/grade-policies

Absences:

DOS-deanofstudents@email.arizona.edu to share documentation about the challenges you are facing.

The UA policy regarding absences for any sincerely held religious belief, observance or practice will be accommodated where reasonable,

https://policy.arizona.edu/human-resources/religious-accommodation-policy

Attendance Policy: Class attendance will not be graded.

Incompletes (I) and withdrawal (W):

Requests for incomplete (I) or withdrawal (W) must be made in accordance with University

policies, which are available at

http://catalog.arizona.edu/policy/grades-and-grading-system#incomplete

Absences:

Please notify your instructor if you have an emergency situation that prevents you from submitting work on time and would like to request an extension of the due date. If you must miss the equivalent of more than one week of class, you should contact the Dean of Students Office:

DOS-deanofstudents@email.arizona.edu to share documentation about the challenges you are facing.

The UA policy regarding absences for any sincerely held religious belief, observance or practice will be accommodated where reasonable,

https://policy.arizona.edu/human-resources/religious-accommodation-policy

Make up exams will only be allowed in cases of a Dean's excuse or emergencies, with advanced approval of instructors. The make-up exam may involve additional components, such as additional questions and/or an oral component. If you anticipate being absent, are unexpectedly absent, or are unable to participate in class activities, please contact us as soon as possible as per the policies above.

Safety on Campus and in the Classroom:
For a list of emergency procedures for all types on incidents, please visit the website of the Critical Incident Response Team (CIRT): https://cirt.arizona.edu/case-emergency/overview (link is external).

Also watch the video available at https://arizona.sabacloud.com/Saba/Web_spf/NA7P1PRD161/common/learningeventdetail/crtfy000000000003560

UA Academic policies and procedures:

https://academicaffairs.arizona.edu/syllabus-policies

Accessibility and Accommodations:
At the University of Arizona, we strive to make learning experiences as accessible as possible. If you anticipate or experience barriers based on disability or pregnancy, please contact the Disability Resource Center (DRC, 520-621-3268, https://drc.arizona.edu/) to establish reasonable accommodations. The **DRC is designated by the institution to ensure access for disabled students and employees.** As such, all disability documentation and requests for accommodations must be handled by DRC. Students can affiliate with DRC through an online process. Our Access Consultants work with students and collaborate with instructors and colleges regarding reasonable accommodations and DRC's processes.

Student Assistance:

https://deanofstudents.arizona.edu/support/student-assistance

Academic Advising:
If you have questions about your academic progress this semester, please reach out to your academic advisor (https://advising.arizona.edu/advisors/major**). Contact the Advising Resource Center (**https://advising.arizona.edu/**) for all general advising questions and referral assistance. Call 520-626-8667 or email to** advising@arizona.edu

Code of Academic Integrity:
Students are encouraged to share intellectual views and discuss freely the principles and applications of course materials with each other. **However, graded work/exercises must be the product of independent effort unless otherwise instructed**. Students are expected to adhere to the UA Code of Academic Integrity as described in the UA General Catalog.
See: https://deanofstudents.arizona.edu/policies/code-academic-integrity
The University Libraries have some excellent tips for avoiding plagiarism:
https://new.library.arizona.edu/research/citing/plagiarism

Selling class notes and/or other course materials to other students or to a third party for resale is not permitted without the instructor's express written consent. Violations to this and other course rules are subject to the Code of Academic Integrity and may result in course sanctions. Additionally, students who use D2L or UA email to sell or buy these copyrighted materials are subject to Code of Conduct Violations for misuse of student email addresses. This conduct may also constitute copyright infringement.

Classroom Behavior Policy:
To foster a positive learning environment, students and instructors have a shared responsibility. We want a safe, welcoming, and inclusive environment where all of us feel comfortable with each other and where we can challenge ourselves to succeed.

The UA Threatening Behavior by Students Policy prohibits threats of physical harm to any member of the University community, including to oneself. See

https://policy.arizona.edu/education-and-student-affairs/threatening-behavior-students

Nondiscrimination and Anti-Harassment Policy: The University of Arizona is committed to creating and maintaining an environment free of discrimination. In support of this commitment, the University prohibits discrimination, including harassment and retaliation, based on a protected classification, including race, color, religion, sex, national origin, age, disability, veteran status, sexual orientation, gender identity, or genetic information. For more information, including how to report a concern, please
see **http://policy.arizona.edu/human-resources/nondiscrimination-and-anti-harassment-policy (link is external).**

Statement of Copyrighted Materials: Students are advised that all course materials disseminated by the instructor to the students, whether in-class or online (i.e. D2L), are original materials and as such, reflect intellectual property of the instructor or author of those works. Any notes and handouts are intended for individual use by the student. Selling class notes and/or other course materials to other students or to a third party for resale is not permitted without the instructor's express written consent. Violations to this and other course rules are subject to the Code of Academic Integrity and may result in course sanctions. Additionally, students who use D2L or UA e-mail to sell or buy these copyrighted materials are subject to Code of Conduct Violations for misuse of student e-mail addresses. This conduct may also constitute copyright infringement.

Confidentiality of Student Records:
https://registrar.arizona.edu/privacy-ferpa/ferpa-compliance

University-wide Policies link: http://catalog.arizona.edu/syllabus-policies

UA Academic policies and procedures:

https://academicaffairs.arizona.edu/syllabus-policies

Land Acknowledgement: We respectfully acknowledge the University of Arizona is on the land and territories of Indigenous peoples. Today, Arizona is home to 22 federally recognized tribes, with Tucson being home to the O'odham and the Yaqui. Committed to diversity and inclusion, the University strives to build sustainable relationships with sovereign Native Nations and Indigenous communities through education offerings, partnerships, and community service. For more information about the native lands on which UArizona sits, see nasa.arizona.edu.

Commitment to Diversity, Inclusion, and Respect: Diversity unites and moves us forward. The diverse backgrounds, experiences and perspectives that each student brings to this class will be viewed as a resource, strength, and benefit. In this class, we have a unique and important opportunity to learn from the information and ideas shared by each other, and we also a responsibility to do so with sensitivity and respect.

Ideally, science would be objective. However, as you will learn, much of science is subjective and is historically built on a small subset of privileged voices. It is important to make note of this and to think about how significant research findings may be biased by their nature of being carried out on a typically small, non-representative sample of participants.

We would like to create a learning environment for my students that honors diverse identities (including race, ethnicity, gender, age, class, sexuality, nationality, religion, ability, etc.), and supports a diversity of experiences, thoughts, and perspectives. To learn more about the UA's commitment to diversity, and inclusion, please visit https://diversity.arizona.edu/ The University is also committed to creating and maintaining an environment free of discrimination; see https://policy.arizona.edu/human-resources/nondiscrimination-and-anti-harassment-policy. Our classroom is a place where everyone is encouraged to express well-formed opinions and their reasons for those opinions. We also want to create a tolerant and open environment where such opinions can be expressed without resorting to bullying or discrimination of others.

Preferred Name and Pronouns: This course affirms people of all gender expressions and gender identities. The university recognizes that many members of its community use names other than their legal or official names first provided to the university (official/legal name) to identify themselves. For some, a chosen or preferred name may be an important component of their identity, especially their gender identity.

If you would prefer that a different name from your legal one or the one that appears on the class roster be used, the university has established guidelines that allow students and employees to indicate their chosen or preferred first names. A student or employee's preferred name will appear instead of the person's official/legal name in select university-related systems and documents (e.g. D2L, official email display name, UAccess, etc.), provided that the preferred first name is not being used for the purpose of misrepresentation. Please see the following link for more information: https://lgbtq.arizona.edu/use-chosen-or-preferred-names

We want to be sure that we refer to you in your preferred way. If you prefer a name other than the one on our class roster, please let us know. If you have certain pronouns that you want us to use, please include them when you sign your email. We will try our best to remember your preferred names and pronouns, but please also feel free to give us a reminder. Also, students are able to update and edit their pronouns in UAccess. To change your listed pronoun on UAccess, navigate to the Student Self Service page, go to the personal information section, and click on "Names". Options include (he, him, his), (she, her, hers), (they, them, theirs), (xe, xem, xyr), and (ze, zir). More information on updating your preferred name and pronouns is available on the Office of the Registrar site at https://www.registrar.arizona.edu/ and https://lgbtq.arizona.edu/students.

Additional Resources for Students:

Service Members and Veterans:

If you are a current service member or veteran reach out to the VETS center. VETS is an organization run by veterans, spouses, dependents, and current service members who, through their shared experiences, endeavor to maintain a dynamic and effective program which is responsive to the needs of the community. More information can be found at https://vets.arizona.edu.

Basic Needs Statement:

Basic needs insecurity affects 1 in 3 college students at the University of Arizona, which can impact students both inside and outside of the classroom and affect their opportunity to learn. Any student who has difficulty accessing sufficient food, clothing, and hygiene items or who lacks a safe and stable place to live and believes this may affect their performance in the course, is urged to contact the Dean of Students for support. In addition, the University of Arizona Campus Pantry is open for students to receive supplemental groceries and the Campus Closet is available for free clothing items. For all information about on-campus and off-campus resources, please visit https://asuatoday.arizona.edu/basic-needs.

Mental Health Resources:

Personal concerns such as stress, anxiety, depression, attentional difficulties, relationship difficulties, etc. can interfere with your ability to succeed and thrive at the University of Arizona. UA has assembled an excellent set of health-related resources at https://health.arizona.edu. For helpful links to mindfulness exercises, free mental health apps, mental health groups, and other tools to help cope with stress, click on the "Support Your Mental Health" link in this webpage: https://health.arizona.edu/take-charge-your-well-being-2021.

For UA's Counseling & Psych Services (CAPS) 24/7 hotline, call (520) 621-3334. Relatedly, if you are experiencing unexpected barriers to your success in your courses, please note the Dean of Students Office is a central support resource for all students and may be helpful. The Dean of Students Office's Student Assistance Program helps students manage crises, life traumas, and other barriers that impede success. The staff addresses the needs of students who experience issues related to social adjustment, academic challenges, psychological health, physical health, victimization, and relationship issues, through a variety of

interventions, referrals, and follow up services. https://deanofstudents.arizona.edu/support/student-assistance

Email: DOS-deanofstudents@email.arizona.edu (link sends e-mail) Phone: 520-621-7057

Are you in crisis? Here are some ideas about where to go or who to call:

Located in Tucson? Call the Community-Wide Crisis Line 24 hours a day, 7 days a week at 520-622-6000. https://www.namisa.org/crisis-line/

Are you a University of Arizona student? If it is not an emergency and you are a UA student, call or walk-in to Counseling and Psych Services at 520-621-3334 Monday - Friday. Walk-in triage is available between 9 am and 4 pm Monday - Friday.

Are you a concerned friend? Concerned friends can find out more about helping a friend who might be experiencing problems through our Friend 2 Friend website: https://friend2friend.arizona.edu/

Resources for sexual assault, relationship violence, and stalking: The UA CAPS Oasis Sexual Assault and Trauma Services (Oasis) can be reached at 520-626-2051. https://survivorsupport.arizona.edu

24-Hour Hotlines:

The National Suicide Prevention Lifeline is a 24-hour, toll-free, confidential suicide prevention hotline available to anyone in suicidal crisis or emotional distress. By dialing 1-800-273-TALK (8255), the call is routed to the nearest crisis center in our national network of more than 150 crisis centers. The Lifeline's national network of local crisis centers provides crisis counseling and mental health referrals day and night. https://988lifeline.org/

Crisis Text Line: Text HOME to 741741 from anywhere **in the United States**, anytime, about any type of crisis. A live, trained Crisis Counselor receives the text and responds, all from a secure online platform. Find out more about how it works at https://crisistextline.org

Suicide Prevention for LGBTQ Youth through the Trevor Project (https://www.thetrevorproject.org/get-help/#sm.0000n8i5bxqvkcwf10zbfu33lvh1r)

- The Trevor Lifeline is a 24/7 suicide hotline: 866-4-U-TREVOR (1-866-488-7386)
- TrevorChat: Online instant messaging available 7 days a week, 3 pm – 10 pm ET (12 pm – 7 pm PT)
- TrevorText: Confidential and secure resource that provides live help for LGBTQ youth with a trained specialist, over text messages. Text TREVOR to 1-202-304-1200 (available 7 days a week, 3 pm – 10 pm ET, 12 pm – 7 pm PT)

Veterans' Suicide Prevention Lifeline: 1-800-273-TALK (1-800-273-8255). https://988lifeline.org/help-yourself/veterans/

SAMHSA Treatment Referral Hotline (Substance Abuse): 1-800-662-HELP (1-800-662-4357). https://www.samhsa.gov/find-help/national-helpline

National Sexual Assault Hotline: 1-800-656-HOPE (1-800-656-4673). https://ohl.rainn.org/online/

Loveisrespect (National Dating Abuse Helpline): Call 1-866-331-9474 (TTY: 1-866-331-8453). Text LOVEIS to 22522 - you'll receive a response from a peer advocate prompting you for your question. Go ahead and text your comment or question and we will reply. http://www.loveisrespect.org/

Survivor Advocacy Program: Call 520-621-5767 or email survivoradvocacy@email.arizona.edu.

The Survivor Advocacy Program provides confidential support and advocacy services to student survivors of sexual and gender-based violence. The Program can also advise students about relevant non-UA resources available within the local community for support. https://survivorsupport.arizona.edu/

Subject to Change Statement:

Information contained in the course syllabus, other than the grade and absence policy, may be subject to change with advance notice, as deemed appropriate by the instructor; see http://policy.arizona.edu/faculty-affairs-and-academics/course-syllabus-policy-undergraduate-template.

NSCS 311 ONLINE: Scientific Programming using Matlab (3 units)
Professor Jessica Bowersock
SYLLABUS

Course description: This course will provide an introduction to computer programming in Matlab, a practical high- level computing language freely available on campus and commonly used in Neuroscience and Cognitive Science research. This course will satisfy the programming requirement of the NROS degree; however, unlike any of the general-purpose programming courses currently allowed by NROS degree requirements, it is tailored to the background and needs of NROS students. The course will be graded based on in-class challenges and five programming assignments. This version of the course is completely online.

*Note that the person that prepared and delivered the lectures videos, Professor Higgins, is not the instructor for the course and will not response to email inquiries regarding the NROS 311 online course. Prof Bowersock is the instructor for this course and all inquiries regarding course content should be directed to them.

Instructor: Dr. Jessica Bowersock, Lecturer, Depts. of Neuroscience
Email: jbowersock@arizona.edu
When emailing be sure to include NROS 311 in the subject line
Office Hours: To be announced on D2L, will be conducted on Zoom at https://arizona.zoom.us/my/profBowersock
A note on how Zoom office hours work:
My "office hours" will be held periodically near assignment due dates on Zoom. If you want to see me, please come on time to office hours, and wait in the Zoom waiting room as I help each student one-on-one in the order that they showed up. In general, I will keep seeing students until there are no students left waiting, and then conclude my office hours, exactly as I would if there were a line of students waiting outside my office in person. Please be aware that if you show up significantly after my office hours start, you are risking that I may have already left.

Course objectives and expected learning outcomes:
At the completion of this course, you are expected to be able to:
- Explain the basic operation of a computer and how it differs from human thought processes
- Explain the types of data a computer can (and cannot) represent
- Verbally describe an algorithm for performing a given computation and then code it in Matlab
- Write a program, based on high-level blocks (some from the course and some built in to Matlab) to read data from a file in various formats, process that data, print an analysis of the data, plot it in a number of ways, and write results back to a file.

In terms of NROS learning outcomes, this course addresses at least outcomes A.4, A.11, B.2, B.3, and B.6.

Required Textbook and Other Readings: No text; any readings will be provided on D2L.
Course Website and Online Discussions: All information about the course, including this syllabus, will be posted on the course's D2L website. It is your responsibility to check that website regularly for announcements and other course information.
Prerequisites and Corequisites: None.
Required equipment/software: You'll need a computer capable of running Matlab and Zoom at the same time.

Matlab is available free to you here:
Chromebooks and netbooks can't run Matlab.

A note on D2L in-class challenges: In this online course your in-class challenges will be graded by a software tool in D2L. You should develop your code for each programming challenge in Matlab on your computer first, and get it working as described in class. Only then paste the code into D2L and try it. There are significant limitations of the D2L version of Matlab as compared to the full desktop version. For example, you can't hear sounds online, and you can't make moving figures. For that reason, the output of some of the challenges will be limited online, and look different than they do on your desktop. The checks of your program possible online are also very limited; don't assume that because you pass the online tests that your code is completely correct. Always update your code from the solution given in the lecture after each challenge.

Course pacing: Since this course is online, you are free to watch lectures at your own pace. However, there are due dates given on D2L for the 5 assignments. In order to stay on schedule, you should watch 4 lectures every week for the 7.5 week term. The introductory module should be completed before the first assignment is posted, and the other modules completed by their respective due dates.

Topics to be covered:
• Programming as an essential research tool
• What is a computer?
• What is the "native language" of the computer? What is a "higher-level" language?
• How to think like a computer (learn to be blind and obey mindlessly)
• Introduction to Matlab's user interface, GUI, windows, nomenclature (console, editor, ...) • Top-down program design and function definition
• Functions versus scripts
• Fundamental data types
• Structures and arrays of structures
• The "cell" data type (arrays of strings)
• Making simple plots (plot)
• Matrices, vectors (basic linear algebra), and operations upon them
• Basic unary and binary operators (<, >, ==, ~=, &&, ||)
• Program flow operators (if/else, for, while, switch ...)
• Selected crucial built-in functions (max, min, length,...)
• Program bug diagnosis and repair (the editor)

Grading policy:
• Regular grades will be given for this course: ABCDE.
• Grade will be primarily based on 5 programming assignments worth 20% each to be assigned in class.
• Late policy: a late assignment loses 40% of its course credit per day, or any part thereof.
• In-class challenges are each worth one point. These points are applied as bonus points to the next assignment due, but cannot be used to exceed 100%, and do not carry over to the following assignment.
• The last assignment will serve as the final summative assessment for the course.
• Grading Scheme:
o 90-100% A o 80- 89% B o 65- 79% C o 50- 64% D o 0-49%E
This scale may be slid down (that is, lower numbers may get higher letter grades) at the instructor's discretion.

Programming assignments:
The course will be graded based on 5 assignments. Assignments due dates will be posted on D2L. Assignments will be turned in as Matlab (".m") files in the appropriate D2L assignment folder. Details of each assignment will be given in class. Since each assignment is worth 20% of your grade, make sure to turn something in every time! A missing assignment will drop you by two letter grades! You will be allowed as many submissions in D2L as you like, but only the most recently submitted file at the time the assignment is due will be graded.
You should look on these assignments as take-home examinations, and complete them independently, along with all other work in this course. Collaboration on these assignments is considered cheating, for which serious sanctions may be applied. By turning in any assignment or submitting any in-class challenge, you certify that it is the product of your work alone.

Academic advising: If you have questions about your academic progress this semester, please reach out to your academic advisor (https://advising.arizona.edu/advisors/major). Contact the Advising Resource Center (https:// advising.arizona.edu/) for all general advising questions and referral assistance. Call 520-626-8667 or email to advising@.arizona.edu.

Life challenges: If you are experiencing unexpected barriers to your success in your courses, please note the Dean of Students Office is a central support resource for all students and may be helpful. The Dean of Students Office can be reached at (520) 621-2057 or DOS-deanofstudents@email.arizona.edu.
Physical and mental-health challenges: If you are facing physical or mental health challenges this semester, please note that Campus Health provides quality medical and mental health care. For medical appointments, call (520) 621-9202. For After Hours care, call (520) 570-7898. For the Counseling & Psych Services (CAPS) 24/7 hotline, call (520) 621-3334.

Other University Policies and Information:
• Attendance: Because this course is online, you will be required to view all class meetings, but not to attend in person. The UA policy regarding absences for any sincerely held religious belief, observance or practice will be accommodated where reasonable; please inform the instructor of any conflicts at the beginning of the semester. Absences pre-approved by the UA Dean of Students (or Dean Designee) will be honored. The UA's policy concerning class attendance, participation, and administrative drops is available online. Students who have late assignments due to illness or emergency are required to submit documentation from their health-care provider or other relevant, professional third parties. Failure to submit third-party documentation may result in late points being deducted.
• Requests for incomplete or withdrawal must, surprisingly, be made in accordance with the afore-linked University policies.
• Academic conduct: Students are encouraged to share intellectual views and discuss freely the principles and applications of course materials. However, graded work/exercises must be the product of independent effort unless otherwise instructed. Students are expected to adhere to the University of Arizona Code of Academic Integrity.
• Threatening student behavior: The Arizona Board of Regents' Student Code of Conduct, ABOR Policy 5-308, prohibits threats of physical harm to any member of the University community, including to oneself. Threatening or disruptive student behavior will not be tolerated in accordance with University policy.
• Disabilities: Our goal in the classroom is that learning experiences be as accessible as possible. If you anticipate or experience physical or academic barriers based on disability, please let the instructor know immediately so that we can discuss options. You are also welcome to contact the Disability Resource Resource Center to establish reasonable accommodations. If you have reasonable accommodations,

please plan to meet with me by appointment or during office hours to discuss accommodations and how my course requirements and activities may impact your ability to fully participate.
• Confidentiality of Student Records: Student records will be kept confidential as required by University Policy and Federal Law.
• Expected classroom behavior: University Policy forbids the use of cellular phones and other computing devices during class, in cases where it distracts from or disrupts the course discussion.
• Plagiarism: I encourage you to look carefully at Prohibited Conduct in the University Code of Academic Integrity, especially where it addresses plagiarism. This seemingly blatant behavior can be more subtle than you might believe. Note carefully that the policy forbids assisting others to plagiarize. Thus if you provide your program, or the results of your program, to the class on Facebook and it shows up in any material turned in for a grade, you and all of the students who used the information you posted have violated the Code of Academic Integrity.
• Non-discrimination and anti-harassment: The University is committed to creating and maintaining an environment free of discrimination. University Policy prohibits discrimination, including harassment and retaliation, based on a protected classification, including race, color, religion, sex, national origin, age, disability, veteran status, sexual orientation, gender identity, or genetic information. The University encourages anyone who believes he or she has been the subject of discrimination to report the matter immediately at the link given above.
• If you have really been enjoying the long and ever-growing list of University policies above, you might want to just read the whole list. I'm particularly fond of the Policy on Policies, which is how these policies keep multiplying.

Faculty Ownership Rights of Lecture Notes and Course Materials:

The instructor holds the copyright to all programs, computer code, algorithms, questions, lectures, slides, quizzes, exams, and any other original course materials, whether in written, electronic, verbal, or any other form. Class sessions may not be audio- or video-recorded without the instructor's specific written consent. This copyright includes student notes or summaries that substantially reflect the instructors' lectures, discussions, or materials. These materials are made available only for personal use by students, and students may not distribute or reproduce the materials for commercial purposes without the instructor's specific written consent. This does not prevent students from sharing notes on an individual basis as protected by the "fair use" doctrine of copyright law. Violation of the instructors' copyright may result in course sanctions and violate the Code of Academic Integrity.

Subject to Change Statement:

Information contained in this syllabus, other than the grading policy, may be subject to change with advance notice, as deemed appropriate by the instructor. Any changes to this syllabus will be posted on the course D2L website.

Fall 2023: NROS 330 Principles of Neuroanatomy (iCourse/AZ Online)

COURSE INFORMATION

Course Description: This online course is designed to provide students with an understanding of anatomy and function of all human brain and spinal cord structures. Emphasis will be on gross and microanatomy of the brain, cranial nerves, spinal cord, and spinal nerves in normal and pathological states in the human. Additionally, the course will cover some selected animal models that are used to study human brain diseases.

Dates: 10/12/2023-12/06/2023

Prerequisites: Introductory biology (e.g. MCB/BIOC/EEB/MICR 181 & 182), general college chemistry, elementary quantitative reasoning and problem solving at an advanced college level. NSCS200 or NROS 307 are strongly recommended. College-level courses in organic chemistry and cell biology or biochemistry are recommended.

Instructor: Julie E. Miller, Ph.D
Dept. of Neuroscience
Gould-Simpson Bldg Rm 423
E-mail: juliemiller@arizona.edu
Office Hours: via zoom, to be announced

Preceptors:
Natalie Pavlick: npavlick@arizona.edu
Madelyn Barsness: madelynmbarsness@arizona.edu
Office Hours: via zoom, to be announced

Course Format/Site: Online only and asynchronous (no live lectures); pre-recorded lectures were developed by Marina Cholanian, Ph.D. Site: d2l.arizona.edu

Course objectives: Fundamental knowledge about the anatomy of the brain, spinal cord, and peripheral nervous system and how the circuits integrate will be conveyed in lecture format and through participation in discussion activities.

NSCS Learning Outcomes: This course contributes to the following learning objectives for the NSCS major (see NSCS website for more details): A1, A10, A11, NS14, NS15, NS16.

Course Communications: This will be conveyed through e-mail and the D2L announcements page. Students are responsible for reviewing these communications in a timely manner.

Recommended Textbooks: (freely available as a hard cover or e-book through the UA libraries-see below; also you can purchase them through the UA bookstore)

1) Nolte's The Human Brain: An Introduction to its Functional Anatomy (8th Edition); Vanderah & Douglas (Elsevier) [Dr. Nolte was a professor in the College of Medicine here at the UA and originally developed this textbook; Prof Miller took his medical course in Neuroanatomy
ISBN: 978-0323653985
March 2020
Freely available as hardcover or e-book from UA libraries (must be logged into VPN if off-campus): https://www-clinicalkey-com.ezproxy4.library.arizona.edu/#!/browse/book/3-s2.0-C2018000609X

2) *Nolte's The Human Brain in Photographs and Diagrams* (5th edition); Vanderah & Douglas (Elsevier)
ISBN: 978-0323598163
Jan 2019
Freely available as hardcover or e-book from UA libraries (must be logged into VPN if off-campus): https://www-clinicalkey-com.ezproxy4.library.arizona.edu/#!/browse/book/3-s2.0-C20170008030

Lectures: Recorded and self-paced. Lectures contain a playposit exercise along with videos of anatomical dissections and subject case examples. Active participation in these exercises will earn credit based on participation and not accuracy of answers. Each exercise will be worth 5 points. 35 out of 39 in-class exercises will count towards the final grade.

Study Questions: Each lecture is accompanied by some study questions to guide you in integrating that lecture's material. Students are responsible for knowing the contents of the whole lecture including embedded videos, images, etc.

Assignments and Examinations:

Quizzes: There will be a quiz testing your knowledge for that week's module worth 100 points. Each quiz is open from Friday to Monday at 5pm. You have 45 min to take the quiz. The quiz consists of 12 questions (multiple choice, True/False, fill in the blank) split pretty evenly across the lectures for that module. There are seven total quizzes, and they are automatically graded. They are open book/notes, but you cannot consult a classmate nor an AI platform. **There is NO final exam.**

Participation Assignments: The Assignments tab in D2L contains three assignments for modules 2 (25 pts), 4 (25 pts), 6 (20 pts) worth a total of 70 pts. Write a short paragraph containing an effortful answer to that question directly in the text box for participation points (it is not graded for accuracy).

Grading Scale and Policies:
The final grade for NROS 330 will be determined out of 945 points as follows:

1. Quizzes will count for 700 points (100 points per module x 7 modules).
2. Playposit exercises embedded in the recorded lecture will count for 175 points (5 participation points per exercise-not graded for accuracy); 35 out of 39 in-class exercises will count towards the final grade.
3. Participation Assignments: will count 70 points (25, 25, 20 pts) points per discussion, graded for effort and not accuracy)

Final Course Grade Assignments:

A	90-100%
B	80-89%
C	70-79%
D	60-69%
E	below 60%

http://catalog.arizona.edu/policy/grades-and-grading-system
***Please note that grades cannot be negotiated as that would not be fair to the entire class. Any final numerical grades at 0.5 decimal points or less from a new letter grade will be rounded up. For example, an 89.5 will become a 90 (resulting in an A).**

Requests for incompletes (I) and withdrawal (W):

These requests must be made in accordance with University policies which are available at
http://catalog.arizona.edu/policy/grades-and-grading-system#incomplete and
http://catalog.arizona.edu/policy/grades-and-grading-system#Withdrawal respectively.

Students are responsible for being aware of deadlines and conditions for a Withdrawal from the course. They are strongly urged to discuss their concerns early on with the instructor.

Honors credit: None

Schedule of Topics: see D2L course site for more details
Module 1: The Central Nervous System
Module 2: The Cranial Nerves
Module 3: Pain & Touch and the Somatosensory System
Module 4: Motor Control
Module 5: Hypothalamic Nuclei
Module 6: Analyzing the Nervous System, and the Limbic System
Module 7: The Special Senses and Models of Brain Disease

Absences:
Please notify your instructor if you have an emergency situation that prevents you from submitting work on time and would like to request an extension of the due date. If you must miss the equivalent of more than one week of class, you should contact the Dean of Students Office: DOS-deanofstudents@email.arizona.edu to share documentation about the challenges you are facing. The UA policy regarding absences for any sincerely held religious belief, observance or practice will be accommodated where reasonable,
https://policy.arizona.edu/human-resources/religious-accommodation-policy

Accessibility and Accommodations:
At the University of Arizona, we strive to make learning experiences as accessible as possible. If you anticipate or experience barriers based on disability or pregnancy, please contact the Disability Resource Center (DRC, 520-621-3268, https://drc.arizona.edu/) to establish reasonable accommodations. The **DRC is designated by the institution to ensure access for disabled students and employees.** As such, all disability documentation and requests for accommodations must be handled by DRC. Students can affiliate with DRC through an online process. Our Access Consultants work with students and collaborate with instructors and colleges regarding reasonable accommodations and DRC's processes.

Student Assistance:
https://deanofstudents.arizona.edu/support/student-assistance

Academic Advising:
If you have questions about your academic progress this semester, please reach out to your academic advisor (https://advising.arizona.edu/advisors/major). Contact the Advising Resource Center (https://advising.arizona.edu/) for all general advising questions and referral assistance. Call 520-626-8667 or email to advising@arizona.edu

Code of Academic Integrity:
Students are encouraged to share intellectual views and discuss freely the principles and applications of course materials with each other. **However, graded work/exercises must be the product of**

independent effort unless otherwise instructed. Students are expected to adhere to the UA Code of Academic Integrity as described in the UA General Catalog.
See: https://deanofstudents.arizona.edu/policies/code-academic-integrity
The University Libraries have some excellent tips for avoiding plagiarism:
https://new.library.arizona.edu/research/citing/plagiarism

Selling class notes and/or other course materials to other students or to a third party for resale is not permitted without the instructor's express written consent. Violations to this and other course rules are subject to the Code of Academic Integrity and may result in course sanctions. Additionally, students who use D2L or UA email to sell or buy these copyrighted materials are subject to Code of Conduct Violations for misuse of student email addresses. This conduct may also constitute copyright infringement.

Classroom Behavior Policy:
To foster a positive learning environment, students and instructors have a shared responsibility. We want a safe, welcoming, and inclusive environment where all of us feel comfortable with each other and where we can challenge ourselves to succeed.
The UA Threatening Behavior by Students Policy prohibits threats of physical harm to any member of the University community, including to oneself. See
https://policy.arizona.edu/education-and-student-affairs/threatening-behavior-students

Nondiscrimination and Anti-Harassment Policy: The University of Arizona is committed to creating and maintaining an environment free of discrimination. In support of this commitment, the University prohibits discrimination, including harassment and retaliation, based on a protected classification, including race, color, religion, sex, national origin, age, disability, veteran status, sexual orientation, gender identity, or genetic information. For more information, including how to report a concern, please see http://policy.arizona.edu/human-resources/nondiscrimination-and-anti-harassment-policy **(link is external).**

Safety on Campus and in the Classroom
For a list of emergency procedures for all types on incidents, please visit the website of the Critical Incident Response Team (CIRT): https://cirt.arizona.edu/case-emergency/overview (link is external).

Also watch the video available
at https://arizona.sabacloud.com/Saba/Web_spf/NA7P1PRD161/common/learningeventdetail/crtfy00000000003560

Statement of Copyrighted Materials:
Students are advised that all course materials disseminated by the instructor to the students, whether in-class or online (i.e. D2L), are original materials and as such, reflect intellectual property of the instructor or author of those works. Any notes and handouts are intended for individual use by the student. Selling class notes and/or other course materials to other students or to a third party for resale is not permitted without the instructor's express written consent. Violations to this and other course rules are subject to the Code of Academic Integrity and may result in course sanctions. Additionally, students who use D2L or UA e-mail to sell or buy these copyrighted materials are subject to Code of Conduct Violations for misuse of student e-mail addresses. This conduct may also constitute copyright infringement.

Confidentiality of Student Records:
https://registrar.arizona.edu/privacy-ferpa/ferpa-compliance

University-wide Policies link: http://catalog.arizona.edu/syllabus-policies

Land Acknowledgement:

We respectfully acknowledge the University of Arizona is on the land and territories of Indigenous peoples. Today, Arizona is home to 22 federally recognized tribes, with Tucson being home to the O'odham and the Yaqui. Committed to diversity and inclusion, the University strives to build sustainable relationships with sovereign Native Nations and Indigenous communities through education offerings, partnerships, and community service. For more information about the native lands on which UArizona sits, see nasa.arizona.edu.

Subject to Change Statement:

Information contained in the course syllabus, other than the grade and absence policy, may be subject to change with advance notice, as deemed appropriate by the instructor; https://policy.arizona.edu/faculty-affairs-and-academics/course-syllabus-policy-undergraduate-template

NROS 412: Learning and Memory

COURSE INFORMATION

Description

The course is designed to provide a solid grounding in mechanisms of learning and memory at the molecular, cellular, behavioral level. After all, learning and remembering are properties of an organism that interacts with its environment and requires molecules and neural circuits that can sense, process, and output information via behavior. Only with insights at all levels can one begin to approach a comprehensive understanding of learning and memory. A combination of lectures and discussions of research papers will comprehensively discuss the current state of knowledge regarding the neurobiological basis of learning and memory derived from invertebrate to mammalian model systems. The course will discuss topics including the biochemical basis of cellular information processing, genes and gene regulation in memory formation, the role of long-term changes in synaptic connections for memory, multimodal signal integration at the molecular level and its role in memory, and biochemical mechanisms of information storage.

Course Objectives and Expected Learning Outcome

- To provide you with a solid background of learning theory and synaptic physiology.
- To familiarize you with model systems dissecting molecular and cellular mechanisms of learning and memory.
- To acquaint you with biochemical mechanisms of long-term changes in synaptic function and information storage.
- To familiarize you with the molecular basis of learning and memory disorders.

Recommended Prerequisite(s)

NROS 307 (Neurophysiology).

Course Format: Online

Instructor: Dr. Jessica Bowersock

Email: jbowersock@arizona.edu

when emailing, you MUST MUST *MUST* include NROS.412 in the subject line.

Textbook: NONE

Additional Readings

Additional readings and learning material will be made available on the D2L website of the course.

GRADING

The course will be based on exams, quizzes and participation in in-class presentations.

Grading Policy

Paper Summaries	150 points
Study Questions	50 points
Playposit Questions	60 points
Final Paper	100 points
Exams	140 points
Total	500 points

Grade Assignment
A: 90-100%
B: 80-89%
C: 65-79%
D: 50-64%
E: <50%

Exams: There will be two exams in the course each worth 70 points.

Paper Summaries: There will be 5 papers examined in class. For each paper, please summarize the points of the paper in no less than 400 words. For one of those points, describe or draw out the key piece of data that proves that point. Each summary will be worth 30 points.

Final Paper: There will be one paper focused on testing hypotheses derived from the primary literature covered in class. This will be worth 100 points.

Study Questions: The first two modules contain study questions. Each set will be worth 25 points.

Playposits: Each lecture has associated playposit questions that can be completed to earn points.

COURSE DUE DATES

Module 1:
study questions due on March 22nd
Exam 1 opens & closes on March 25th
Module 2:
study questions are due April 5th
Exam 2 opens & closes on April 8th
Module 3:
Paper summaries are due on April 22nd
Final paper is due May 6th

COURSE POLICIES

Attendance Policy

Regular attendance of lectures is considered essential to reach a satisfactory understanding of the course material. Lack of attendance will adversely affect the participation portion of the final grade. All holidays or special events observed by organized religions will be honored for those students who show affiliation with that particular religion. Absences pre-approved by the UA Dean of Students (or Dean designee) will be honored. Make-up exams or quizzes require approval and will only be allowed in cases of well-documented emergencies. Make up exams or quizzes are likely to be modified from the original. The UA's policy concerning Class Attendance, Participation, and Administrative Drops is available at: http://catalog.arizona.edu/policy/class-attendance-participation-and-administrative-drop . The UA policy regarding absences for any sincerely held religious belief, observance or practice will be accommodated where reasonable, http://policy.arizona.edu/human-resources/religious-accommodation-policy.

Student Code of Academic Integrity

The UA's policy concerning Class Attendance, Participation, and Administrative Drops is available at: http://catalog.arizona.edu/policy/class-attendance-participation-and-administrative-drop

The UA policy regarding absences for any sincerely held religious belief, observance or practice will be accommodated where reasonable, http://policy.arizona.edu/human-resources/religious-accommodation-policy. Students are encouraged to share intellectual views and discuss freely the principles and applications of course materials. However, students are expected to adhere to the UA *Code of Academic Integrity.* Graded work (exams and quizzes) must be the product of independent effort unless otherwise instructed. The policies related to issues like cheating and plagiarism will be strictly enforced. Read the full Code at http://deanofstudents.arizona.edu/codeofacademicintegrity

Classroom Behavior and Classroom Policies Regarding Effective Learning
In addition, individuals in groups can learn best when all are considerate of each other. Therefore, we ask that you please make every effort to make the environment in the classroom conducive to effective learning. This includes such things as turning off your cell phone, only using your laptop for class related activities, refraining from conversation that is not geared toward the topic of the day, arriving on time, and leaving when class is finished. Read the full *Student Code of Conduct* at http://deanofstudents.arizona.edu/studentcodeofconduct

Principle (from the above website). Integrity is expected of every student in all academic work. The guiding principle of academic integrity is that a student's submitted work must be the student's own. This principle is furthered by the student Code of Conduct and disciplinary procedures established by ABOR Policies 5-308 - 5-403, all provisions of which apply to all University of Arizona students. This Code of Academic Integrity (hereinafter "the Code") is intended to fulfill the requirement imposed by ABOR Policy 5-403.A.4 and otherwise to supplement the student Code of Conduct as permitted by ABOR Policy 5-308.C.1. When you sign your name to your work, you are signing that it is solely your work.

UA Nondiscrimination and Anti-harassment Policy
The University is committed to creating and maintaining an environment free of discrimination; see http://policy.arizona.edu/human-resources/nondiscrimination-and-anti-harassment-policy. Our classroom is a place where everyone is encouraged to express well-formed opinions and their reasons for those opinions. We also want to create a tolerant and open environment where such opinions can be expressed without resorting to bullying or discrimination of others.

Policy against threatening behavior
The UA Threatening Behavior by Students Policy prohibits threats of physical harm to any member of the University community, including to oneself. See http://policy.arizona.edu/education-and-student-affairs/threatening-behavior-students.

Notification of Objectionable Materials
Warning of course content that may be deemed offensive by some students.

Students with Disabilities
Our goal in this classroom is that learning experiences be as accessible as possible. If you anticipate or experience physical or academic barriers based on disability, please let me know immediately so that we can discuss options. You are also welcome to contact the Disability Resource Center (520-621-3268) to establish reasonable accommodations. For additional information on the Disability Resource Center and reasonable accommodations, please visit http://drc.arizona.edu.

Confidentiality of Student Records

See http://www.registrar.arizona.edu/ferpa/default.htm

Academic advising: If you have questions about your academic progress this semester, or your chosen degree program, please note that advisors at the Advising Resource Center can guide you toward university resources to help you succeed.

The information in this course syllabus, other than the grade and absence policies, may be subject to change with reasonable advance notice, as deemed appropriate by the instructor. Any changes to the syllabus will be announced in class and posted on the D2L website.

"Animal brains, evolution, signals, and social behaviors" (NROS 381)
Online Fall 2023 (Aug 21 – Oct. 11/2023)

Course Description: "Animal brains, evolution, signals, and social behaviors" is an **online** undergraduate level course.
This seven-week three-credit course is based on lectures of various lengths, each covering individual topics. Students are encouraged to raise questions and discuss issues *via* email to the instructors. The course is intended as a broad introduction to the relationship between brain organization, its evolution, and behavior, using selected examples from animals and humans.

Course Objectives: This course introduces fundamental aspects of neuronal organization and nervous system functionalities across phyla. It considers the early evolution of brain and central nervous systems, focusing on correspondences of organization and pathways, particularly in chordates and arthropods, considering sensory perception, processing, integration and motor control. The course discusses the relationship between the functional organization of brains and the signals in the animal world that brains process to elicit behavioral actions. The course provides an appreciation of strategies used to observe, analyze, and study functional brain organization, relating this to the study of animal behavior, including social and sexual interactions within and between species.

Prerequisite(s): Two courses from Tier One, Natural Sciences (NATS 101, 102, 104).
Approved as: General Education Tier Two - Natural Sciences.

Instructors:

Nicholas Strausfeld, Ph.D.
Dept. of Neuroscience
Gould-Simpson Sci. Build. 415
(flybrain@arizona.edu)
http://neurosci.arizona.edu/faculty/strausfeld/lab

Wulfila Gronenberg, Ph.D.
Dept. of Neuroscience
Gould-Simpson Sci. Build. 422
(wulfilag@arizona.edu)
http://neurosci.arizona.edu/faculty/gronenberg

Individual meetings *via* Zoom by email appointment

Expected learning outcomes:
The overarching goal of the course is to provide students with a breadth and depth of understanding about the field of neuroscience, how nervous systems generate and control behavior (neuroethology), and how nervous systems have evolved.
Concepts are explored in great depth through presentations by the instructors and will introduce students to current research issues as well as the underlying historical ideas and technical approaches that lead to our current knowledge.
Students will develop the capacity to think critically and flexibly about complex problems involving the brain and behavior, and to apply ethical and professional standards to their evaluation of brain and behavior-related research and technical development in the context of their own work and in the context of issues in the larger societal community.

Absence and Class Participation: Participating in the course requires attending all online lectures and taking the first and the final online exams, which help in recapitulating the learned subject matter and also serve to assess class attendance and are the basis for performance grading.
The UA's policy concerning Class Attendance and Administrative Drops is available at: https://catalog.arizona.edu/policy/class-attendance-and-participation. Absences for an entire week or longer for medical, religious, or other reasons will have to be pre-approved by the UA Dean of Students (see: https://deanofstudents.arizona.edu/policies/attendance-policies-and-practices).

Per University policy, on average, students should expect up to 2 hours of work 'out of class' for each hour 'in class' (online lectures).

Course Communications: For online communication, please use the instructors 'official' UA e-mail address, preferred (or email *via* D2L)

Grading Scale and Policies: Grades will be based on the student's performance on the two online exams (mid-term and final). These exams will mainly focus on the subject matter of the previous weeks, but the final exam may comprise a few questions referring to the lecture content of the first three weeks.
Please note:
As students may not be used to having only two exams ('mid-term' and final), hence not getting any grades early on in the course, the first exam will only cover the first two weeks count 25% of the total course grade, while the final exam will count for 75% of the total grade. This way, students will have a better chance to improve their grade if they do not perform as well as expected during the first two weeks of the course.

Letter Grade	Percentage
A	90-100
B	80-89
C	70-79
D	60-69
E	0-59

Required Texts or Readings: The class is **not based on a textbook and there are no absolute reading requirements**. However, we suggest the following books that provide a good **background**, although no single book will cover all the issues and examples dealt with in class: Günther Zupanc: **Behavioral Neurobiology**. Oxford University Press (2019); Sillar, Pictona and Heitler: **The Neuroethology of Predation and Escape**. Wiley (2016). Any textbook on **Neuroscience** will cover the basic information about the nervous system; most textbooks on **Human Physiology** will give sufficient background about brain and nerve cells. Medical school textbooks on **Human Anatomy and Physiology** give a reasonable introduction into how the human brain works. Part of the **behavioral examples** will be covered in books on **Animal Behavior**. If you want to acquire such texts, used books not older than ca. 10 years would be appropriate. Many **online resources** exist about neuroscience, nervous systems, brains and behavior.

It is the student's responsibility to check the course website regularly for announcements and other important course information.

–Course schedule

Note: some videos are short, others are longer, hence the different number of videos per topic

week	topic	videos
August 21-26	Introduction to **Brains & neurons** Introduction to **Animal behavior**	1-6 7-11
Aug. 28 – Sept. 2	**Brain evolution** **Sensory representation**	12 – 14 15 - 17
Sept. 2	**Mid-term exam**	
Sept. 4 – 9	**Vision** (receptors) **Vision** (advanced processing) **Mechanosensation**	18 - 24 25 – 26a 27 - 30
Sept 11 – 16	**Auditory** processing **Olfaction**	31 - 33 34, 35
Sept. 18 – 23	**Locomotion** **Fast responses / Escape**	36 – 43 44 & 46
Sept. 24 – 30	**Neuromodulation** **Learning / Memory**	47, 48 49 - 52
Oct. 2 – 7	**Brain size** **'Social' brains**	53 – 57 58 - 60
Oct. 7-8	**Final exam**	

Life challenges: At the University of Arizona, we strive to make learning experiences as accessible as possible. If you are experiencing unexpected barriers to your success in this course, please note that the Dean of Students Office is a central support resource for all students and may be helpful. The Dean of Students Office can be reached at 520-621-2057 or DOS-deanofstudents@email.arizona.edu.
If you anticipate or experience barriers based on disability or pregnancy, please contact the Disability Resource Center (520-621-3268, https://drc.arizona.edu/) to establish reasonable accommodations.

UA Nondiscrimination and Anti-harassment Policy: The University is committed to creating and maintaining an environment free of discrimination; see http://policy.arizona.edu/human-resources/nondiscrimination-and-anti-harassment-policy

Subject to Change Statement: Other than the grade and attendance policy, this syllabus may be subject to change with advance notice, as deemed appropriate by the instructors. Any changes of the syllabus will be announced in class and posted on the D2L website.

Confidentiality of Student Records: http://www.registrar.arizona.edu/ferpa/default.htm

Faculty Ownership Rights in Lecture Notes and Course Materials
The University of Arizona holds the copyright of the lectures, lecture slides, quizzes and exams, and other course original materials..These materials are made available only for

personal use by students, and *students may not distribute or reproduce the materials for commercial purposes without the University's express written consent*. (This does not prevent students from sharing notes on an individual basis for personal use.) Violation of the instructors' copyright may result in course sanctions and violate the Code of Academic Integrity.

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There are many sources for finding reliable (peer-reviewed) additional information about the content of the lectures (or additional topics). However, random websites, social media and blogs generally express opinions and may not contain reliable information.

One reliable scientific source is Google Scholar.

Another valuable resource is PubMed.

How to find an article on PubMed

Go to the UAz website→academics→libraries→health sciences library→databases→click on the P in the list of alphabet letters→scroll down to PubMed (HSL)→type in whatever you are looking for.

You can type in a doi, a PMID, an author's last name (if there are several authors, type in the last names of several of them), an article title, or simply key words. Once you have clicked search, you can further specify some limits, like you want a review in the last 5 years, the species of animal, etc.

Once you find an article you want in the list, click on the title which usually will bring you to a page with the title, authors, journal, and abstract. Up in the right-hand corner, you will find some buttons to get the full article. Usually all of them will work, but sometimes only one will. Click on one of the buttons. Somewhere on the page that comes up you will find a button that says "pdf". Click on that. You'll usually get an html version of the pdf. If so, click on the page icon on the top right to download the pdf, and save that version. *These articles are all free.*

Occasionally, you will run into an article for which the UA system does not have an institutional subscription. Not to worry. Go back to the database page and click on "request materials" →interlibrary loan. That will get you to a page to type in the info needed for the library to go out on its network to find you a copy. Within a couple of days, sometimes even the same day, you will get an email with a link to a pdf. Articles located by Google Scholar in journals that restrict direct access may be located in the UA library if it carries on-line issues of that journal. Go on-line to the UA library site, go to the 'Find a journal' page and then locate the relevant journal, (or type its name or ISSN), then locate the year/issue in which the article appeared, then the article.

Where to go, who to call if you're in crisis:

Located in Tucson? Call the Community-Wide Crisis Line 24 hours a day, 7 days a week at 520-622-6000.

Are you a University of Arizona student? If it is not an emergency and you are a UA student, call or walk-in to Counseling and Psych Services at 520-621-3334 Monday - Friday. Walk-in triage is available between 9 am and 4 pm Monday - Friday.

Are you a concerned friend? Concerned friends can find out more about helping a friend who might be experiencing problems through our Friend 2 Friend website.

Resources for sexual assault, relationship violence, and stalking.

24-Hour Hotlines:

The National Suicide Prevention Lifeline is a 24-hour, toll-free, confidential suicide prevention hotline available to anyone in suicidal crisis or emotional distress. By dialing 1-800-273-TALK (8255), the call is routed to the nearest crisis center in our national network of more than 150 crisis centers. The Lifeline's national network of local crisis centers provides crisis counseling and mental health referrals day and night.

Crisis Text Line: Text HOME to 741741 from anywhere **in the United States**, anytime, about any type of crisis. A live, trained Crisis Counselor receives the text and responds, all from a secure online platform. Find out more about how it works at crisistextline.org.

Suicide Prevention for LGBTQ Youth through the Trevor Project:

- **The Trevor Lifeline** is a 24/7 suicide hotline: 866-4-U-TREVOR (1-866-488-7386)
- **TrevorChat:** Online instant messaging available 7 days a week, 3 pm - 10 pm ET (12 pm -- 7 pm PT)
- **TrevorText:** Confidential and secure resource that provides live help for LGBTQ youth with a trained specialist, over text messages. Text TREVOR to 1-202-304-1200 (available 7 days a week, 3 pm - 10 pm ET, 12 pm -- 7 pm PT)

Veterans' Suicide Prevention Lifeline: 1-800-273-TALK (1-800-273-8255)

SAMHSA Treatment Referral Hotline (Substance Abuse): 1-800-662-HELP (1-800-662-4357)

National Sexual Assault Hotline: 1-800-656-HOPE (1-800-656-4673)

Loveisrespect (National Dating Abuse Helpline): Call 1-866-331-9474 (TTY: 1-866-331-8453). Text LOVEIS to 22522 - you'll receive a response from a peer advocate prompting you for your question. Go ahead and text your comment or question and we will reply.

NROS 418 (online): Fundamental principles in systems neuroscience

Spring 2024 (updated 12/6/2023)

Course Information

Course Objectives

This course approaches the study of neural systems by analyzing and comparing common but critical neurophysiological features that underlie the functioning of and interactions among various neural systems. Our materials will include the primary literature to delve into the nature of these functionalities within the context of specific systems as well as brain properties that overlay and coordinate system functions.

Expected Learning Outcomes

You will be able to:

1. Explain how neurons detect and process sensory information, including receptor function and transduction processes. Compare and contrast these processes in various sensory modalities.
2. Describe the fundamental anatomical organization (include diagrams) and functional properties of the visual, auditory, olfactory, taste, and somatosensory systems.
3. Explain how motor behaviors are generated, including the basic anatomy and function of the reflex circuits, the descending motor pathways, the central pattern generators, and the higher order brain circuits in regulating movement.
4. Explain how brain rhythms and diffuse modulatory circuits affect functioning of the nervous system.
5. Describe the fundamental anatomical organization (include diagrams) and network function of the circuits responsible for common behaviors such as eating, emotion, and social interactions, understand how these circuits integrate sensory information and control movement outputs.
6. Predict the consequences of lesions within the neural pathways, understand the mechanism and affected nervous system in common neurological diseases such as Parkinson's diseases, anxiety and depression.

Course schedule and topics

First 7-week session: 01/10/2024 - 03/01/2024

2024

JANUARY

Su	Mo	Tu	We	Th	Fr	Sa
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

FEBRUARY

Su	Mo	Tu	We	Th	Fr	Sa
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29		

MARCH

Su	Mo	Tu	We	Th	Fr	Sa
					1	2

Study guides due every Thursday (highlighted in yellow); exam days highlighted in cyan.

Suggested study schedule

Weeks	Lecture	Contents (recorded videos)	Quiz	Study guide due
Week 1	1	Course introduction	2	
	2	Fundamentals of neural circuits	3	1 (1st Thu) 1/11
	3	Visual system 1 – retina	5	
	4	Visual system 2 – receptive field	1	
	5	Visual system 3 – visual pathway	2	
Week 2	6	Visual system 4 – cortex and perception	3	
	7	Visual system 5 – wiring and plasticity	1	2 (2nd Thu) 1/18
	8	Auditory system 1 – hearing structures	3	
	9	Auditory system 2 – neural pathway	5	
	10	Auditory system 3 – sound location	2	
Week 3	11	Olfactory system	3	
	12	Taste	2	3, 4 (3rd Thu) 1/25
	13	Somatosensory system 1 – peripheral	3	
	14	Somatosensory system 2 – pathway	3	
	15	Somatosensory system 3 – cortex	3	
Week 4	16	Pain	4	
		Study for exam		5,6 (4th Thu) 2/1
		Midterm exam covers contents in lecture 1-16		2/2
	17	Peripheral motor system 1 – muscle control	3	
	18	Peripheral motor system 2 – motor neuron and reflex	3	
Week 5	19	Spinal motor system 1 – Rhythmic movement	3	
	20	Spinal motor system 2 – CPG mechanism	3	7 (5th Thu) 2/8
	21	Brain motor system 1 – descending pathways & cortex	3	
	22	Brain motor system 2 – motor control & cerebellum	2	
	23	Brain motor system 3 – basal ganglia	4	
Week 6	24	Visceral and Autonomic nervous system	3	
	25	Neuromodulation	3	8 (6th Thu) 2/15
	26	Emotion & Learned fear	3	
	27	Fear extinction & Innate fear	3	
	28	Stress response 1 – HPA/HPG axis	3	
Week 7	29	Stress response 2 – chronic stress	3	
	30	Gut-brain axis & Microbiota	3	9 (7th Thu) 2/22
	31	Motivated behaviors 1	3	
	32	Motivated behaviors 2	3	
	33	Social and sexual behaviors	7	
Week 8 (half)		*Study for exam*		10 (8th Thu 2/29
		Final Exam covers contents in lecture 17-33		3/1

Course Description

This course will provide a principle understanding of how neural systems encode sensory information and form perceptions of the external world, make decisions, and generate movements, and control behaviors and other physiological processes by description and analysis of neural circuits.

Credit. 3 units. Per University policy, on average, students should expect up to 2 hours of work out of class for each hour in class.

Teaching Methods and learning Process

- The course materials will outline the main points of the course and the students are expected to study them in detail by referencing the related textbooks.
- Assignments every week.
- There will be a short quiz (expected to finish in less than 5 min) in every lecture.
- There will be **no discussion sessions.**

Required Competencies - Course Prerequisites or Corequisites

This course assumes that you have a strong grounding in the fundamentals of cellular neurophysiology and that you have completed your chemistry and physics pre-requisites. You are responsible for reminding yourself of this material as needed. Classes will include lecture as well as small-group discussions and small projects/problem-solving exercises.

Pre-requisite courses: NSCS 200, NROS 307, Chemistry, Physics
Recommended: NSCS 315B

Measurable Module/Unit Learning Objectives

There will be three modules:

Module 1: Sensory system

1. Describe the major neural circuits components of the visual, auditory, taste, olfactory, and somatosensory systems.
2. Explain how the physical stimuli for each sensory system (light/photon for vision, sound for hearing, chemicals for taste and olfaction, and multiple stimuli for somatosensation) are translated to the membrane potentials of the nervous system.
3. Explain the basic principles of how the sensory information are encoded and transferred by the sensory neural pathways.
4. Explain how the sensory processing will be affected if certain neural component of the sensory system was impaired.

Module 2: Motor system

1. Describe the major neural pathways of the motor system from cortex to muscles.
2. Describe the function of the major brain regions in motor control.
3. Explain how the movement problem of Parkinson's Diseases are regulated by the basal ganglion and list the possible therapeutic strategies.

Module 3: Behavioral system

1. List the basic neural pathways from sensory inputs, central processing and motor outputs of emotion, stress response, feeding and social interaction behaviors.
2. Describe the major experimental approaches to study the anatomy and function of the neural circuits for behaviors.

Materials and Technical/Computer Information

Texts or Readings

Besides the course materials posted on D2L, we recommend these textbooks for reference

1. Kandel, ER. *et al*. (2021) *Principles of Neural Science* 6th edition. New York: McGraw Hill Medical. ISBN 9781259642234. Note: a previous version (5th edition, 2013) can also be used, the electronic version of this book (5th edition, 2013) is available to students in UA library. Note: this textbook is the most comprehensive reference book, but it contains much more information than is covered the course.
2. Luo, L (2020) *Principles of Neurobiology*. New York: Garland Science. ISBN 9781003053972. Note: this is a relatively concise textbook focusing on key experiments.
3. Bear, MF. *et al*. (2016) *Neuroscience: Exploring the Brain, 4th Edition*. Philadelphia: Wolters Kluwer. 978-2-36110-080-3.
4. Purves, D. *et al*. (2018) Neuroscience 6th edition. New York: Oxford University Press. ISBN 9781605353807.

Required or special materials

None

Grading Information

Grading Scale

You are expected to attend and actively participate in every phase of the course. Final grades will be based on total points. Your grade for each assignment will be posted in D2L.

Total possible points:
A = 90-100%
B = 80-89%
C = 70-79%
D = 60-69%

Assignment	Points	~% of Final Grade
Quizzes: (100@1 point each)	*100*	*20%*
Study guides assignment: 10 study guides in total; each varies in the number of questions; 100 questions in total; 2 points per question;	*200*	*40%*
Mid-term exam	*70*	*14%*
Final exam	*130*	*26%*

Grading Policies

Late assignments
Assignments turned in up to a day late (from the posted deadline) will lose half of the possible points available. Without permission given before the posted deadline, assignments will not be accepted more than 1 day late.

Re-grading policy

If you believe that there has been an error in grading of an assignment, quiz or exam, please contact the instructor who will review the material in question. *You must initiate a request for re-grading within 1 week of the date on which the grade was posted*, otherwise we will not consider the request.

Assignment Information

Required Examination and papers

Study guide questions will be posted on D2L (see D2L-Contents: **Quizzes**/ ***Study guides***). It will require readings from class lectures (PPT file with brief text will be posted on D2L), textbooks by Kandel, Luo or Bear or Purves, and occasionally from other sources. You may use the textbooks, online resources (vetted sources), or material found on PubMed. See the end of this document for how to locate an article on PubMed if you do not already know how to do so. Study guides will have multiple choice answers. The length of study guides varies, some will have fewer, others more questions, depending on the respective topics. ***Study guides must be turned in (D2L) on the due date indicated on the class schedule. You have 6 days to work on each study guide*** (see suggested study schedule above). The study guides differ in length, as do the lectures. Some study guides cover only one lecture or one topic, while most others cover several topics and have more questions to answer.

Quizzes. Quiz questions are embedded in the recorded lectures. There are usually 2-3 quiz questions in each lecture.

Exams. A ***mid-term and a final exam*** will be posted on D2L (see D2L-Contents: **Quizzes**). The mid-term exam will have fewer questions and yield fewer points than the final exam (see table above). This way you will have a better idea about what to expect for the final, and more important, exam. All exam questions will have multiple-choice answers. Unlike the Study guides, these exams are **not 'open book'**; you will have a **limited time** to answer the questions based on what you have learned. You might consider taking notes for each section (lecture, lecture slides) and/or when you are working on your study guides. Those notes may be helpful for the exams because you cannot go back to watch the previous lectures or slides during the exams.

Required extracurricular activities

Not applicable

Final Exam or Project

See class schedule

Course and University Policies

Threatening Behavior Policy

The UA Threatening Behavior by Students Policy prohibits threats of physical harm to any member of the University community, including to oneself. See http://policy.arizona.edu/education-and-student-affairs/threatening-behavior-students.

Nondiscrimination and Anti-harassment Policy

University Policy 200E on prohibited behaviors: http://policy.arizona.edu/human-resources/nondiscrimination-and-anti-harassment-policy

Class Participation and Absence Policy

Accessibility and Accommodations: At the University of Arizona, we strive to make learning experiences as accessible as possible. If you anticipate or experience barriers based on disability or pregnancy, please contact the Disability Resource Center (520-621-3268, https://drc.arizona.edu) to establish reasonable accommodations.

The UA's policy concerning Class Attendance, Participation, and Administrative Drops is available at: http://catalog.arizona.edu/policy/class-attendance-participation-and-administrative-drop

The UA policy regarding absences for any sincerely held religious belief, observance or practice will be accommodated where reasonable, http://policy.arizona.edu/human-resources/religious-accommodation-policy.

Absences pre-approved by the UA Dean of Students (or Dean Designee) will be honored. See: https://deanofstudents.arizona.edu/absences

Accommodations for students with disabilities

Statement for reasonable accommodations provided by the Disability Resources Center: drc.arizona.edu/instructors/syllabus-statement

Subject to Change Statement

Information contained in the course syllabus, other than grade and course policies, may be subject to change with advance notice, as deemed appropriate by us. Any changes to the syllabus will be announced in class and posted on the D2L website.

Academic Integrity policy

Student Code of Academic Integrity that prohibits plagiarism: deanofstudents.arizona.edu/policies-and-codes/code-academic-integrity

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How to find an article on PubMed

Go to the UAz website→academics→libraries→health sciences library→databases→click on the P in the list of alphabet letters→scroll down to PubMed (HSL)→type in whatever you are looking for.

You can type in a doi, a PMID, an author's last name (if there are several authors, type in the last names of several of them), an article title, or simply key words. Once you have clicked search, you can further specify some limits, like you want a review in the last 5 years or the species of animals or clinical trials, etc.

Once you find an article you want in the list, click on the title which usually will bring you to a page with the title, authors, journal, and abstract. Up in the right-hand corner, you will find some buttons to get the full article. Usually all of them will work, but sometimes only one will. Click on one of the buttons. Somewhere on the page that comes up you will find a button that says "pdf". Click on that. You'll usually get an html version of the pdf. If so, click on the page icon on the top right to download the pdf, and save that version. *These articles are all free.*

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Sensing and action in predator/prey encounters

Spring 2024

Instructor: Dr. Melville Wohlgemuth
Email: wohlgemuth@arizona.edu
Office hours: send an email and we will figure out a time to meet (either zoom or in person)
Telephone: 520-621-6640

Required textbook: The neuroethology of predation and escape
(http://www.wiley.com/WileyCDA/WileyTitle/productCd-0470972246.html)

Course description: Receiving and responding to environmental stimuli are fundamental components in a wide variety of behaviors, including the critically important behaviors of finding prey and avoiding predation. In this course, we will examine both invertebrate and vertebrate systems to understand how organisms use sensory systems to detect prey and predators, and how motor systems to guide appropriate actions. We will begin by examining predator/prey interactions mediated through vision, followed by olfaction, audition and electrolocation. The course will then cover escape and predatory behaviors for a wide variety of organisms. For each topic, we will first discuss sensing behaviors, the neural machinery of sensory systems, and how sensory signals are used to guide species-specific escape and attack behaviors at the levels of the central and peripheral nervous systems.

Course prerequisites: NSCS 307, Cellular Neurophysiology

Course website: All information about the course, including the syllabus, additional reading materials, lecture slides, and homework assignments, will be posted at the course's D2L Website. It is the student's responsibility to check the website regularly to be updated on announcements and other important course information.

Course objectives:

- To impart the importance of behavioral studies to a complete understanding of nervous system function for biologically-relevant tasks.
- To demonstrate that the study of specialized animal systems can lead to a broad and deep understanding of nervous system function and separate species-specializations from general function.
- To foster critical analysis of original research and hypothesis testing, and the skills to convey this information to a general audience through writing and oral communication.

Expected learning outcomes:

At the completion of this course students are expected to understand:

- The sensory transduction processes for vision, olfaction, audition, and electrolocation
- How sensory experiences inform adaptations to both predatory and defensive behaviors
- Quantitative evaluations of behavior and how this leads to predictions about underlying neural circuits
- How different pharmacological agents act in the nervous system, and their use for predatory and defensive behaviors
- This course contributes to the following learning objectives for the NSCS major (see NSCS website for more details):
    - A1, A3, A8, A11, NS13, NS14, NS16, NS17, NS18, B1, B3, B4, B5, and C1

Course organization and assignments:

In this course, we will read and discuss textbook chapters and primary research articles. Students will sign up for a topic at the beginning of the semester, and they will choose an article from a list provided by the instructor, or another relevant paper. For each topic we cover, students will present a detailed written report on research articles. There will also be two (2) quizzes and one midterm examination. The final project is an opportunity to pitch your own idea for a research project involving sensorimotor integration using one of the model systems discussed in class.

Overview of course requirements:

- Weekly readings from texts and original research articles. NOTE: All reading assignments should be completed prior to viewing the associated lecture.
- Two written critique papers (2-3 pages single spaced) on an original research article. The papers are due before the end of the week in which the relevant book material is covered. Each report should include:
    1) A concise summary of the conceptual framework for the research report.
    2) The hypothesis being tested.
    3) A clear description of the experimental design and methods
    4) A summary of the results
    5) An overview of the interpretation of the research findings
    6) A critical assessment of points discussed in 1-5
    7) Concrete suggestions for future experiments on topics covered in the article
- Weekly Think-Pair-Share: written questions on readings/lecture for each chapter.
- Quizzes (2): 10 minutes
- Midterm: At the end of Week 4, and it will cover text and lecture material covered up to Week 7 (Chapters 1-7)
- Final research project proposal: Mock research proposal for an experiment in the field of neuroethology. The research proposal format is a scientific poster presentation (using Powerpoint, Illustrator, etc.) and should include an introduction explaining the important background and framing the question to be addressed (1 section with bullet points); a detailed methods section (1-2 figures and legends); a section with predicted results and possible pitfalls (2-3 figures and legends); and a discussion of the broader implications of the outcomes (1 section with bullet points). You will have the opportunity to develop your ideas for the project in class and in discussion with the instructor.

Course grades will be based on the following:

- Quizzes: 15%
- Reviews/critiques of research articles: 15%
- Think-pair-share: Preparation of written questions; Discussion: 15%
- Midterm exam: 20%
- Final Project Research Proposal: 35%
- Grading criteria:
  A = 90-100 %
  B = 80-89 %
  C = 70-79 %
  D = 60-69 %
  F < 60%

Absence and class participation policy (new guidance with respect to COVID):

- Notify your instructor(s) if you will be missing a course deadline.
- If you must miss the equivalent of more than one week of class, you should contact the Dean of Students Office DOS-deanofstudents@email.arizona.edu to share documentation about the challenges you are facing.
- The UA's policy concerning Class Attendance, Participation, and Administrative Drops is available at: http://catalog.arizona.edu/policy/class-attendance-participation-and-administrative-drop
- The UA policy regarding absences for any sincerely held religious belief, observance or practice will be accommodated where reasonable, http://policy.arizona.edu/human-resources/religious-accommodation-policy.
- Absences pre-approved by the UA Dean of Students (or Dean Designee) will be honored. See: https://deanofstudents.arizona.edu/absences
- If students register for the course late, they will be given an opportunity to make up the missed work.

Academic integrity policy

- Students are encouraged to share intellectual views and discuss freely the principles and applications of course materials. However, graded work/exercises must be the product of independent effort unless otherwise instructed. Students are expected to adhere to the UA Code of Academic Integrity as described in the UA General Catalog. See: http://deanofstudents.arizona.edu/academic-integrity/students/academic-integrity.

- The University Libraries have some excellent tips for avoiding plagiarism, available at http://new.library.arizona.edu/research/citing/plagiarism.

Information contained in the course syllabus, other than the grade and absence policy, may be subject to change with advance notice, as deemed appropriate by the instructor.

Overview of course schedule and assignments

Module / Unit / Week - 1 Vision in prey and predation Olfactory signals	Outcomes • Explain steps of transducing light into electrical signals. • Detail circuitry for orienting towards an object (sensory and motor signaling). • Explain interactions of single neurons with multi-modal stimuli. • Explain steps of transducing olfactory molecules into electrical signals. • Describe circuitry for olfaction. • Explain different methods of olfactory cue localization. • Understand circuity for processing olfactory cues (canonical and specialized smelling).	Learning materials and assessment: (Lectures, readings, videos, etc.) • Chapters 1 and 2 of the book • Research articles and summary (see below)
Module / Unit / Week – 2 Avian hearing Mammalian hearing	Outcomes: • Explain steps of transducing sound vibrations into electrical signals. • Describe how the barn owl performs sound localization in azimuth and elevation. • Understand avian auditory circuitry for timing and loudness differences between the ears. • Explain how phase ambiguity is ultimately resolved at the level of the avian inferior colliculus. • Understand the interactions of visual and auditory maps of the world during the ontogeny of barn owls. • Describe the anatomy and function of the outer, middle, and inner ear of mammals. • Compare/contrast the mammalian auditory system with the avian auditory system. • Describe the functioning of the superior colliculus	Learning materials and assessment: • Chapters 3 and 4 of the book • Research articles and summary (see below) • Quiz 1
Module / Unit / Week – 3 Echolocation Electrolocation	Outcomes: • Understand interactions of hearing sensitivity and behavior. • Describe how bats use biological sonar to determine the 3D location of an object. • Detail circuitry for echolocation, with specific focus on neural coding for range and relative motion of an object. • Explain value of the bat as a general model for nervous system function. • Explain steps of transducing environmental changes in electric potential into electrical signals. • Describe how the electric organ discharge can generate such high voltages. • Detail the differences between strongly electric fish and weakly electric fish. • Understand the jamming avoidance response (JAR) in weakly electric fish from both a signal evaluation (sensory) and a signal adjustment (motor) perspective.	Learning materials and assessment: • Chapters 5 and 6 of the book • Research articles and summary (see below)
Module / Unit / Week – 4 Crustacean escape Fish escape	Outcomes: • Describe differences between the vertebrate and invertebrate nervous systems • Detail differences between electrical vs chemical synapses	Learning materials and assessment: • Chapters 7 and 8 of the book • Research articles and summary (see below) • Midterm

	• Explain circuitry for both LG and MG tail flips, from sensation to motor action. • Detail methodology for research on crayfish. • Explain steps of transducing changes in water currents into electrical signals. • Detail sensorimotor interface at the Mauthner cell for initiating the fish C-start. • Describe how neuromodulators affect circuits and behavior.	
Module / Unit / Week – 5 Startle responses Archerfish hunting	Outcomes: • Describe the typical startle response in mammals, and examples of startle dysfunction. • Detail the various behavioral methods for modulating startle behaviors. • Describe how the air/water interface makes archerfish hunting more challenging. • Explain the purposeful control of the archerfish waterjet for prey at different distances. • Understand the challenges of archerfish hunting in groups, and how individual fish increase their chances of getting the prey first once it falls in the water.	Learning materials and assessment: • Chapters 9 and 10 of the book • Research articles and summary (see below)
Module / Unit / Week – 6 Biological catapults Molluscan defense	Outcomes: • Understand the limitations of muscle movements, and how that led to development of biological catapults. • Describe the interactions of insect and crustacean musculature to generate ballistic movements. • Detail the anatomy and function of the chameleon tongue in insect capture. • Describe molluscan anatomy for jet propulsion. • Detail molluscan neural circuits for jetting. • Understand the behavior and simple circuitry for defensive inking. • Describe how mollusks can change color. • Relate the benefits of research on chromatophores for neuroscience discovery.	Learning materials and assessment: • Chapters 11 and 12 of the book • Research articles and summary (see below) • Quiz 2
Module / Unit / Week – 7 Neurotoxins Final project presentations	Outcomes: • Describe the various cone snail attack strategies from sensation, to sensorimotor integration, to motor action. • Understand differences across the lightning, nirvana, and motor cabals for cone snail attack. • Describe how neurotoxins can be used for behavioral control.	Learning materials and assessment: • Chapter 13 of the book • Research article and summary (see below)

Paper Presentations for each Week

Chapters 1 and 2

Mischiati, Matteo, Huai-Ti Lin, Paul Herold, Elliot Imler, Robert Olberg, and Anthony Leonardo. "Internal models direct dragonfly interception steering." Nature 517, no. 7534 (2015): 333-338.

Wesson, Daniel W., and Donald A. Wilson. "Smelling sounds: olfactory–auditory sensory convergence in the olfactory tubercle." The Journal of Neuroscience 30.8 (2010): 3013-3021.

Chen, Qin, et al. "The thermal background determines how the infrared and visual systems interact in pit vipers." Journal of experimental biology 220.17 (2017): 3103-3109.

Chapter 3

Brainard, Michael S., and Eric I. Knudsen. "Experience-dependent plasticity in the inferior colliculus: a site for visual calibration of the neural representation of auditory space in the barn owl." The journal of Neuroscience 13.11 (1993): 4589-4608.

Asadollahi, Ali, Shreesh P. Mysore, and Eric I. Knudsen. "Stimulus-driven competition in a cholinergic midbrain nucleus." Nature neuroscience 13.7 (2010): 889-895.

Chapter 4

Ito, Shinya, Yufei Si, David A. Feldheim, and Alan M. Litke. "Spectral cues are necessary to encode azimuthal auditory space in the mouse superior colliculus." Nature communications 11, no. 1 (2020): 1-12.

Franken, Tom P., Philip X. Joris, and Philip H. Smith. "Principal cells of the brainstem's interaural sound level detector are temporal differentiators rather than integrators." Elife 7 (2018): e33854.

Chapter 5

Valentine, Doreen E., and Cynthia F. Moss. "Spatially selective auditory responses in the superior colliculus of the echolocating bat." The Journal of neuroscience 17.5 (1997): 1720-1733.

Hechavarría, Julio C., et al. "Blurry topography for precise target-distance computations in the auditory cortex of echolocating bats." Nature Communications 4 (2013).

Stidsholt, L., Greif, S., Goerlitz, H. R., Beedholm, K., Macaulay, J., Johnson, M., & Madsen, P. T. (2021). Hunting bats adjust their echolocation to receive weak prey echoes for clutter reduction. Science Advances, 7(10), eabf1367.

Chapter 6

Catania, Kenneth. "The shocking predatory strike of the electric eel." Science 346.6214 (2014): 1231-1234.

Bastian, Joseph. "Vision electroreception: integration of sensory information in the optic tectum of the weakly electric fish, *Apternotus albifrons*. Journal of Comparative Physiology A 141: 287-297

Chapter 7

Antonsen, Brian L., and Donald H. Edwards. "Mechanisms of serotonergic facilitation of a command neuron." Journal of neurophysiology 98.6 (2007): 3494-3504.

Antonsen, Brian L., Jens Herberholz, and Donald H. Edwards. "The retrograde spread of synaptic potentials and recruitment of presynaptic inputs." The Journal of neuroscience 25.12 (2005): 3086-3094.

Chapter 8

Preuss, Thomas, and Donald S. Faber. "Central cellular mechanisms underlying temperature-dependent changes in the goldfish startle-escape behavior." The Journal of neuroscience 23.13 (2003): 5617-5626.

Medan, Violeta, and Thomas Preuss. "Dopaminergic-induced changes in Mauthner cell excitability disrupt prepulse inhibition in the startle circuit of goldfish." Journal of neurophysiology 106.6 (2011): 3195-3204.

Chapter 9

Müller-Ribeiro, Flávia CF, et al. "Disinhibition of the midbrain colliculi unmasks coordinated autonomic, respiratory, and somatomotor responses to auditory and visual stimuli." American Journal of Physiology-Regulatory, Integrative and Comparative Physiology 307.8 (2014): R1025-R1035.

Pellet, Jean. "Neural organization in the brainstem circuit mediating the primary acoustic head startle: an electrophysiological study in the rat." Physiology & behavior

48.5 (1990): 727-739.

Chapter 10

Ben-Tov, Mor, et al. "Pop-out in visual search of moving targets in the archer fish." Nature communications 6 (2015).

Tsvilling, Vadim, et al. "Archer fish fast hunting maneuver may be guided by directionally selective retinal ganglion cells." European Journal of Neuroscience 35.3 (2012): 436-444.

Chapter 11

deVries, M.S. Murphy, E. A. K., and S. N. Patek. "Strike mechanics of an ambush predator: the spearing mantis shrimp." Journal of Experimental Biology 215.24 (2012): 4374-4384.

Burrows, Malcolm. "Neural control and coordination of jumping in froghopper insects." Journal of neurophysiology 97.1 (2007): 320-330.

Chapter 12

Otis, Thomas S., and W. F. Gilly. "Jet-propelled escape in the squid Loligo opalescens: concerted control by giant and non-giant motor axon pathways." Proceedings of the National Academy of Sciences 87.8 (1990): 2911-2915.

Tublitz, Nathan J., Michelle R. Gaston, and Poh Kheng Loi. "Neural regulation of a complex behavior: body patterning in cephalopod molluscs." Integrative and Comparative Biology 46.6 (2006): 880-889.

York, Carly A., Ian K. Bartol, and Paul S. Krueger. "Multiple sensory modalities used by squid in successful predator evasion throughout ontogeny." Journal of Experimental Biology 219.18 (2016): 2870-2879.

Mäthger, Lydia M., et al. "Disruptive coloration elicited on controlled natural substrates in cuttlefish, Sepia officinalis." Journal of Experimental Biology 210.15 (2007): 2657-2666.

Chapter 13

Dutertre, Sébastien, et al. "Evolution of separate predation-and defence-evoked venoms in carnivorous cone snails." Nature communications 5.1 (2014): 1-9.

Gal, Ram, and Frederic Libersat. "A parasitoid wasp manipulates the drive for walking of its cockroach prey." Current Biology 18.12 (2008): 877-882.

SYLLABUS: AZ Online NROS 440
How to Build a Brain: Mechanisms of Neural Development

Instructor and Contact Information
Dr. Marina Cholanian
shetka@arizona.edu
Office Hours: by appointment in zoom

Description of Course
This course will allow students to explore and analyze our current knowledge of how neurons are born, organized into circuits, shaped by activity, and regenerated after injury. Students will connect the mechanisms of nervous system development with diseases affecting the process. Finally, students will practice and then present critical analysis of published data in the field of developmental neuroscience.

Course Prerequisites or Co-requisites
NROS 200, or (if not a Neuroscience student) MCB 181 or equivalent.

Course Format and Teaching Methods
Lecture and problem solving in class (75%), discussion and presentation of primary literature (25%).

Course Objectives
During this course, students will:

1. Integrate textbook reading, primary literature, and classroom discussion to
    a. Identify and explain mechanisms that determine neuronal cell fate, final location, guidance of projections, and integration into circuits.
    b. Explain how synapses are formed, strengthened, and eliminated.
    c. Describe the contributions of adult neurogenesis and axon regeneration to continued function of the nervous system.
    d. Draw mechanistic connections between essential processes in development and the occurrence of diseases of the nervous system.
2. Read primary literature and critically evaluate evidence supporting our current state of knowledge in neural development.
    a. Methods, Results, Future Experiments (writing)
3. Describe and apply techniques used in the study of neural development
4. Present and explain data and result from a primary article pertaining to neural development to their peers (via video recording), and participate in peer review
5. Hone their writing, speaking, and analysis skills in the pursuit of mastery of course material.

Expected Learning Outcomes
At the end of this course you will be able to:

1. Describe the factors controlling the birth, proliferation, differentiation, and integration of neurons into the central and peripheral nervous systems (NSCS Program Outcome A9, NS12)

2. Explain the origins of psychiatric and developmental disorders affecting neuronal function, and apply knowledge of development to predict likely disorders from disruption of genetic or cellular pathways (NSCS Program Outcome A10, NS17
3. Apply knowledge of common experimental techniques in developmental neurobiology to form conclusions from data in primary literature, evaluate the strengths and weaknesses of data, and design experiments to address current gaps in our knowledge of neurodevelopment (NSCS Program Outcome A11, B1-B6)

Required Texts or Readings

Required Textbook: Development of the Nervous System, 4rd Edition (Sanes, Reh, Harris). ISBN10: 012374539X. The ebook is available from the library at this link, or by using the "Library Links" tab in D2L to search for "Neural Development Sanes" (most recent edition):
https://www-sciencedirect-com.ezproxy3.library.arizona.edu/book/9780128039960/development-of-the-nervous-system
Readings from this book will be required prior to lectures and will be essential to understand primary literature and participate fully in discussion.

Course Communications

All course communication will be done through D2L or by email. Please check your email regularly for updates.

Scheduled Topics/Activities: Please see the attached schedule.
Other Required or Special Materials: None.
Assignments and Examinations: Schedule/Due Dates: The schedule of assignments and assessments and their due dates is attached to the syllabus.

Subject to Change Statement

Information contained in the course syllabus and schedule, other than the grade and absence policy, may be subject to change with advance notice, as deemed appropriate by the instructor. Any changes to the syllabus or schedule will be announced in class and posted on the D2L website.

Grading Scale and Policies

There will be a total of 450 points available in the class. Points will be earned in the following ways:

Modules 1-6:	Each	Total
Article Question Set (drop 1)	30	150
Discussion Board Post (guided) (drop 1)	10	50
End-of-Module Quiz (drop 1)	30	150
Lecture Participation (no drops)	5	30
Module 7:		
End of Module Quiz	15	15
Paper Presentation Assignment:		
Video Presentation	45	45
Peer Review	10	10
TOTAL POINTS:		450

Dropped assignments: If a category has a dropped assignment, your lowest grade will be dropped. If you do not turn in an assignment on time (and you have not pre-arranged for an extension) this will be your dropped assignment. Drops provide flexibility for both students and instructors and allow for improved student performance.

Article Question Set: These assignments are worksheets with questions pertaining to the paper assigned for each module (1-6). Questions will assess your comprehension of the concepts, techniques, and conclusions from each assigned article.

Discussion board posts: A question will be posed to the class. To earn these points, you must reply to the original question and also comment thoughtfully (not just agree/disagree) on at least one other person's post. Deadline for posting and responding will be at the start time of the end-of-module quiz.

End of Module Quiz: These will be quizzes that contain a combination of multiple choice, short answer, and problem-based written answers. Content covered by each quiz will be announced by the instructor in advance and posted on D2L. For module 7, this quiz will cover about half the normal content and so will be worth half of the points of other end-of-module quizzes.

Lecture Participation: For each module, within the videos, there will be responses that require student input (using PlayPosit). When a student enters their response, they will earn the participation point for that video. Five points will be available to earn within each module; extra points beyond five will count as extra credit.

Paper Presentation: You will record a video in which you will present a paper to the class. A detailed rubric will be provided for earning points. Following the posting of videos, you will need to offer comments/feedback on two other students' videos (5 points each).

Late Work Policy: Late work will be subject to loss of 40% of the points for one day late and 10% of the points for every subsequent day. Generally, late assignments are considered to be your dropped assignment for most categories. Extensions are rarely granted, but if there is a true emergency, please contact the instructor at least 1 hour BEFORE the due date/time of the assignment.

Final grade determination: Grading will be on an absolute scale based on the overall percentage of points you have earned in the course. The following is the point breakdown per letter grade:

405-450	A
360-404.5	B
315-359.5	C
270-314.5	D
Less than 270	E

The instructor reserves the right to curve grades upward if final grades are low for the entire class; however, this is an extremely unlikely scenario. In no situation will grades be curved downward.

Makeup Policy for Students Who Register Late
Students will receive all material from the class days that are missed. If a student registers later than the first module quiz, then this will be their dropped quiz.

Dispute of Grade Policy
I will make every attempt to grade assignments fairly and accurately, and within a reasonable time frame. If you believe that there has been an error in grading of an assignment or exam, please contact Dr. Bhattacharya. You must initiate a request for re-grading within 1 week of the date on which the grade was posted, otherwise I will not consider the request.

Requests for incomplete (I) or withdrawal (W) must be made in accordance with University policies, which are available at http://catalog.arizona.edu/policy/grades-and-grading-system#incomplete and http://catalog.arizona.edu/policy/grades-and-grading-system#Withdrawal respectively.

Behavior Policy
Because this is an online course, all work will be done asynchronously. Students are expected to put forth effort in completing assignments and quizzes and to uphold the highest standards of integrity.

University Policies Governing This Course

Accessibility and Accommodations
At the University of Arizona we strive to make learning experiences as accessible as possible. If you anticipate or experience physical or academic barriers based on disability or pregnancy, you are welcome to let me know so that we can discuss options. You are also encouraged to contact Disability Resources (520-621-3268) to explore reasonable accommodation.

Code of Academic Integrity
Students are encouraged to share intellectual views and discuss freely the principles and applications of course materials. However, graded work/exercises must be the product of independent effort unless otherwise instructed. Students are expected to adhere to the UA Code of Academic Integrity as described in the UA General Catalog. See: http://deanofstudents.arizona.edu/academic- integrity/students/academic-integrity.

Conduct prohibited by this Code consists of all forms of academic dishonesty, including but not limited to:

- Cheating, fabrication, facilitating academic dishonesty, and plagiarism as set out and defined in the Student Code of Conduct, ABOR Policy 5-308-E.10, and F.1.
- Submitting an item of academic work that has previously been submitted or simultaneously submitted without fair citation of the original work or authorization by the faculty member supervising the work.
- Violating required disciplinary and professional ethics rules contained or referenced in the student handbooks (hardcopy or online) of undergraduate programs.
- Failing to observe rules of academic integrity established by a faculty member for a particular course.
- Attempting to commit an act prohibited by this Code. Any attempt to commit an act prohibited by these rules shall be subject to sanctions to the same extent as completed acts.
- Assisting or attempting to assist another to violate this Code.

Selling class notes and/or other course materials to other students or to a third party for resale is not permitted without the instructor's express written consent. Violations of this and other course rules are subject to the Code of Academic Integrity and may result in course sanctions. Additionally, students who use D2L or UA e-mail to sell or buy these copyrighted materials are subject to Code of Conduct Violations for misuse of student e-mail addresses. This conduct may also constitute copyright infringement.

Absence and Class Participation Policy

The UA's policy concerning Class Attendance, Participation, and Administrative Drops is available at: http://catalog.arizona.edu/policy/class-attendance-participation-and-administrative-drop.
The UA policy regarding absences for any sincerely held religious belief, observance or practice will be accommodated where reasonable, http://policy.arizona.edu/human-resources/religious-accommodation-policy.
Absences pre-approved by the UA Dean of Students (or Dean Designee) will be honored. See: https://deanofstudents.arizona.edu/absences

Threatening Behavior Policy

The UA Threatening Behavior by Students Policy prohibits threats of physical harm to any member of the University community, including to oneself. See http://policy.arizona.edu/education-and-student-affairs/threatening-behavior-students.

UA Nondiscrimination and Anti-harassment Policy

The University is committed to creating and maintaining an environment free of discrimination; see http://policy.arizona.edu/human-resources/nondiscrimination-and-anti-harassment-policy
Our classroom is a place where everyone is encouraged to express well-formed opinions and their reasons for those opinions without discrimination of others.

Additional Resources for Students

UA Academic policies and procedures are available at http://catalog.arizona.edu/policies
Student Assistance and Advocacy information is available at http://deanofstudents.arizona.edu/student-assistance/students/student-assistance

Confidentiality of Student Records

Information on your rights to privacy of your academic record can be found here: http://www.registrar.arizona.edu/personal-information/family-educational-rights-and-privacy-act-1974-ferpa?topic=ferpa

NEW COURSE

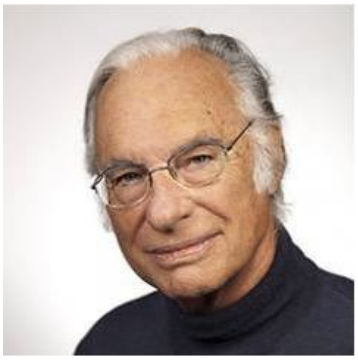
201 Level

Title: "Rationality and Cognition"

Syllabus

Instructor

Massimo Piattelli-Palmarini
Professor of Cognitive Science, Linguistics and Psychology



massimo@email.arizona.edu

Required Texts and Readings

Required: Daniel Kahneman "Thinking Fast and Slow"

Recommended, but optional: Massimo Piattelli-Palmarini "Inevitable Illusions"

Plus: readings and class handouts in D2L (See Course Schedule)

The Course

This course will offer a critical comparison of fully rational, normative principles of decision making and real-life decision processes in a majority of ordinary subjects. It will start with a presentation of the axioms and theorems of mathematical probability theory, followed by a presentation of the most common probabilistic fallacies (mostly derived from Prospect Theory – Tversky and Kahneman being the main classic authors). We will see the framing of decisions, packing/unpacking of choices, anchoring, ease of representation, the conjunction fallacy, the disjunction fallacy, the neglect of base rates and the causal fallacy. The most characteristic examples will be offered to the class and responses will be collected anonymously via clickers (or similar). Lessons from the class responses will be derived.

We will then move onto Subjective Expected Utility (SEU). The axioms will be presented and discussed. After this, the classic examples of violations of the axioms (The Allais Paradox, the Ellsberg Paradox

and more) will be presented to the class and responses will be collected anonymously via clickers (or similar). Lessons from the class responses will be derived.

Finally, elements of game theory and the core notion of Nash Equilibria will be presented, followed by classic examples of non-conformity in the majority of naïve subjects.

Whenever the existing scientific literature on each of these topics will turn out to be too difficult for a 200 level course, the instructor will write simplified handouts explaining the basics in as simple a way as possible without loss of rigor.

Course Objectives

Objective 1: gain a solid understanding of the foundations of rational decision making.

Objective 2: identify decision traps and how to avoid being trapped.

Objective 3: identify how the brain implements decision making.

Objective 4: reflect about the evolution of cognition, the way humans and animals problem solve and communicate with one another.

Expected Learning Outcomes

Outcome 1: Understand the difference between normative models of rational decision making (probability, game theory, maximization of subjective expected utility) and real-life data on how decisions are actually made.

Outcome 2: Learn to detect and correct decision biases and unconscious distortions of how available alternatives are perceived and selected/discarded.

Outcome 3: Gain an understanding of some pathologies in decision making, of their manifestations and of the underlying brain deficits.

Outcome 4: Understand a broad picture of the evolution of the brain, of cognition and of how some components of intelligence are common with non-human primates, while other components are unique to humans.

Classroom Format:

This is a 100% online and asynchronous course, meaning that there will be no regularly scheduled meeting times. Students will follow a course calendar, outlining all of the scheduled activities and assignments students should complete each week throughout the semester. The D2L course management system will be used to conduct the course. I will provide regular reminders through email and announcements on the D2L course site, but it is ultimately the responsibility of the student to progress through the course and complete all assignments by the required deadlines. **To participate in this fully online course, students must have daily, reliable access to D2L.**

The grade

4 Weekly quizzes (See Course Schedule): 30% of the final grade.

Each quiz consists of 10 multiple choice questions (only one answer is the right answer), on what we have seen in class that week and the readings for that week. Each question is worth 1/10th of the grade for the quiz as a whole.

Once opened, each quiz must be completed within 30 minutes.

There is ample time if the student has watched the lectures, has studied the slides projected (available in D2L right after each lecture), and has read the assigned reading(s) for that week. There is not enough time to "go back" to the slides and the readings to select the right answer to the questions.

There are 4 weekly quizzes in total. A student is allowed to miss up to one weekly quiz without any penalty. For those students who will have taken all the weekly quizzes, the lowest grade (if any) will be neglected in the calculation of the grade for the quizzes. Late quizzes and re-takes will not be allowed.

Class Discussions (10% of grade)

Throughout the course there will be **5** discussion prompts posted. Discussions can be accessed by clicking the "Discussion" tab in the top banner in D2L.

Each discussion prompt will be unique to the content being covered that week. Detailed directions will be provided with each prompt, but in general, you will be asked to: read the prompt, comment, and reply to a classmate. Your posts should reflect critical thought and should demonstrate connection to course content. Be sure to read the instructions carefully and leave time to ask questions and allow other students time to respond to your post.

No late discussion posts will be accepted for any reason. Please reference the course schedule for due dates, and plan your schedule accordingly.

Mid-term Examination: 30% of the final grade.

Twenty multiple choice questions on all we will have seen in class until then.
Time to complete: 60 minutes.

Final Examination (non-cumulative): 30% of the final grade.

20 multiple choice questions + one long answer question, individually chosen among three questions suggested. Maximum one page (500 words), 2/3ds of a page is also OK. Time to complete each: one hour, for a total of 2 hours.

Late exams (both midterm and final) and retakes will not be allowed.

Links to the Final Exam Regulations, https://www.registrar.arizona.edu/courses/final-examination-regulations-and-information, and Final Exam Schedule, http://www.registrar.arizona.edu/schedules/finals.htm

Letter Grade Distribution

A = 90-100%
B = 80-89.9%
C = 70-79.9%
D = 60-69.6%
E = Below 60%

Late Assignments

Late work will not be accepted in this course. Quizzes, exams, and discussions will close at the specified time on the listed due date, so late submissions will not be possible. Please plan your schedule accordingly.

Grade Appeals

If you would like to appeal a grade for an assignment, you should do so within 7 days from the day the grade was returned to you. Any appeal that does not come within 7 days will not be considered. If you make an appeal, you should state either (a) why you believe your assignment was incorrectly scored, or (b) why you believe your answer to a particular question or item is correct.

Course Policies:

Classroom behavior policy: This is a fully remote, 100% online course, which includes communication with instructors and peers through email, discussion forums, and web conferencing. Students are expected to act in a respectful and professional manner. The presentation of differing views and perspectives as they relate to course content is encouraged but must be done in a respectful manner. Any disparagement of others' views is unacceptable. All written communication should be checked for spelling and grammar. See the following for more information: https://deanofstudents.arizona.edu/disruptive-behavior

Threatening behavior:

The University seeks to promote a safe environment where students and employees may participate in the educational process without compromising their health, safety or welfare. The Arizona Board of Regents' Student Code of Conduct, ABOR Policy 5-308, prohibits threats of physical harm to any member of the University community, including to one's self. Threatening behavior can harm and disrupt the University, its community and its families. Please see the following document for more information:
http://policy.arizona.edu/education-and-student-affairs/threatening-behavior-students

Academic Integrity: The University student code of Academic Integrity prohibits plagiarism in any and all class assignments and activities in this course. Please see the following document for more information: https://deanofstudents.arizona.edu/policies/code-academic-integrity

Nondiscrimination and Anti-Harassment policy: Our online classroom is a place where everyone is encouraged to express well-formed opinions and their reasons for those opinions. We also want to create a tolerant and open environment where such opinions can be expressed without resorting to bullying or discrimination of others. The University is committed to creating and maintaining an environment free of discrimination; see http://policy.arizona.edu/human-resources/nondiscrimination-and-anti-harassment-policy

Absence and Class Participation Policy: Because this is an online course, absence and class participation will be assessed through the completion of required course assignments. Participation in the course is assessed through the completion of the discussions, where you will interact with your classmates in discussion of course material.

Accessibility and Accommodations:

It is the University's goal that learning experiences be as accessible as possible. If you anticipate or experience physical or academic barriers based on disability or pregnancy, please let me know

immediately so that we can discuss options. You are also welcome to contact Disability Resources (520-621-3268, email: uadrc@email.arizona.edu , http://drc.arizona.edu/) to establish reasonable accommodations.

Subject to Change Statement:
Information contained in the course syllabus, other than the grade policies, may be subject to change with reasonable advance notice, as deemed appropriate by the instructor. If any changes are made, they will be provided immediately in writing to students via posting to the D2L course website.

Incomplete Grade Policy:
Incomplete grades will be given only in special circumstances as outlined in university policy as stated in "The University of Arizona Record General Academic Manual."

Student Responsibility for Managing Their Course Progression: Although the instructor tries to help guide each student through the course, it is ultimately the responsibility of the student to direct their course progress, including following the course schedule, minding due dates, keeping up with required readings, and participating in all class components. All due dates are listed in the syllabus and on the course calendar. If you are having trouble keeping up with course material, please feel free to download the Brightspace Pulse app for course calendar reminders.

Late Assignments: No late work or make-ups are allowed for exams or active learning discussions (ALDs). All due dates are listed clearly in the course calendar, so you will need to plan your schedule accordingly to get assignments completed on time. Late project assignments are penalized at a rate of 10% off per day late, including weekends. No late assignments will be accepted in excess of **one week** past the original due date.

Course schedule (subject to change, with ample previous notice)

Week/Module	**Topic**	**Readings & Audio**	**Assignments: (all due at 11:30 PM on the Sunday at the end of the week)**
Week 1	Welcome + Getting Started	Read all content in Welcome + Getting Started Module	**Complete:** Introduction Discussion Post
Week 1:	Practical issues Then Probability, as it should be	Video Lectures MPP Handout on probability MPP Handout on Bayes	Weekly Quiz 1 Class Discussion 1
Week 2:	Bayes rule Pure logic	Video Lectures MPP Handouts on logic	Weekly Quiz 2 Class Discussion 2

	Some probabilistic fallacies	Kahneman's Chapter 25 "Bernoulli's error"	
Week 3:	Subjective Expected Utility (SEU)The axioms and Violations of SEU	Video Lectures Kahneman's Chapter 29 "The fourfold pattern"	Class Discussion 3 [no Quiz]
Week 4:	Prospect Theory	Video Lectures Kahneman's Chapter 26 "Prospect theory"	Quiz 3 (M3 + M4) [no discussion]
Week 5: Midterm Exam No lectures this week	On all we have seen so far		**Midterm Exam due**
Week 6:	Game Theory (norms and spontaneous choices)	Video Lectures Optional Reading: Rationality and Game Theory, Cristina Bicchieri	Class Discussion 4 **Start preparing for the final**
Week 7:	Neuronal Bases of Decision Making	Video Lectures On Phineas Gage, Simple readings on brain evolution	Quiz 4 (final quiz) Class Discussion 5 (final discussion) Material for the final
Week 8:	Preparation for Final Exam	Video Lectures **Study guide for the final**	**Final exam due May 10th 11:30pm**

Listen

Multisensory Perception
University of Arizona
UA Online

Course Instructor

Sarah Cook, PhD: sarahcook@arizona.edu [Link: mailto:sarahcook@arizona.edu]
PAS 556
Office Hours (through Zoom): available by appointment
Email response time will be within 48 hours

Course Overview

Every day we use our five senses of sight, touch, taste, smell, and hearing to construct our world. How do these senses interact with each other? How does what we feel influence what we taste? How do the senses of vision and touch combine to help us recognize objects? This course will explore the interaction between the senses and the associated neural underpinnings of these interactions.

Course Objectives

This course will cover the following topics

This course will cover the following topics:

1. Development of Multisensory Perception
2. Computational Modeling of Multisensory Perception
3. Multisensory influences on body perception and flavor perception
4. Cross-modal Interactions
5. Synesthesia
6. Evidence from Blindness and Deafness

Expected Learning Outcomes

Upon the completion of this course, students should be able to:

1. Identify the cross-model mechanisms involved in cognitive processes such as object perception, body perception and flavor perception
2. Describe how multisensory processing develops in healthy individuals
3. Describe computational theories of multisensory perception
4. Explain what synesthesia is and how it develops
5. Evaluate evidence from blindness and deafness in terms of what it reveals about multisensory processing

Course Materials

Sathian, & Ramachandran, V. S. (2019). *Multisensory Perception*. Elsevier Science & Technology.

Students will have free access to this textbook using the University of Arizona library.

Classroom Format

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Grading

1. H5P Interactive Presentations (12 @ 7 points each, worth up to 84 points)

Throughout the course, you will have learning activities that ask you to view course material and respond to a variety of questions related to the content and your understanding. These interactive lessons offer you the opportunity to practice and check your knowledge, helping you to study for exams.

2. Discussions (7 @ 20 points each, worth up to 120 points)

You will have a total of 7 discussion prompts to be completed through the course of the semester. Each discussion will ask you to apply the knowledge that you've learned and engage actively with the course material. You should reply to at least one of your classmate's posts as a

part of each discussion. Your lowest discussion grade will be dropped from your final grade. Completion dates can be found in the course assignments calendar on D2L. Links for the discussions can be found in the associated module in D2L, or in the "Discussion" tab in D2L.

3. Exams (3 @ 100 points each, worth up to 300 points)

There will be three required exams, to be completed independently. While you will have access to your notes and course materials, I strongly suggest that you prepare for the exams as if they are closed book. You will have 120 minutes to complete each exam. Exams will consist of multiple choice questions. You will have a completion window for each exam, which can be found in the course assignments calendar on d2l. Links for each Exam can be found inside the associated module in D2L, or under the "Quizzes" tab in D2L.

4. Writing Assignments (3 @ 75 points each, worth up to 225 points)

You will complete three writing assignments through the course of the semester. These assignments will be based on course materials and are intended to foster critical thinking and application of course concepts. Completion dates can be found in the course assignments calendar on D2L. Prompts for each writing assignment will be available in the associated module in D2L or can be found under the "Assignments" tab in D2L.

Letter Grade Distribution

Points	Letter Grade	Percentage
729 – 657 points	A	90 - 100%

656 – 584 points	B	80 - 89.9%
583 – 511 points	C	70 - 79.9%
510 – 438 points	D	60 - 69.9%
437 – 0 points	E	Below 60%

Course Calendar

Week	Dates	Topic	Readings	Assignments
1	7/1 - 7/7	Course Introduction Philosophical Insights	Bruno & Pavani 2018 (Sections 1.1 - 1.4), Textbook Chapter 2	Discussion 1
2	7/8 - 7/14	Object Perception Body Perception	Chapters 7, 8	Discussion 2 Assignment 1
3	7/15 - 7/21	Review for Exam 1 Flavor Perception	Chapter 10	Exam 1 Discussion 3
4	7/22 - 7/28	Audio-Visual Interactions Visual-vestibular interactions	Chapters 9, 11	Discussion 4 Assignment 2
5	7/29 - 8/4	Synesthesia Review for Exam 2	Chapter 12	Discussion 5 Exam 2
6	8/5 - 8/11	Development Models of multisensory integration	Chapters 4, 5	Discussion 6 Assignment 3
7	8/12 - 8/16	Evidence from blindness Mirror Therapy	Chapters 15, 16	Discussion 7 Exam 3

Course Policies

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Activity Details | Completion Summary

Visible

Required: Automatic

View this topic to complete the activity

Multisensory Perception Syllabus.html - Last Modified Jul 24, 2024 12:21 PM

CGSC 321: Methods in Cognitive Science
UA Online

Instructor: Sarah Seger
Email: sarahseger@arizona.edu
Office hours: by appointment

Course description: This course will introduce you to experimental methods in cognitive science and cognitive neuroscience by focusing on selected techniques (e.g., experiments, fMRI, EEG, neuropsychology, noninvasive neuromodulation, psychophysiology, neuropsychology, and modeling).

Class format: 100% Online

Course objectives and expected learning outcomes of CGSC 321
At a fundamental level,

- Identify what types of questions can be answered using cognitive science & cognitive neuroscience research methods.
- Define the common methodologies and experimental designs used in research in cognitive science and cognitive neuroscience.
- List the strengths and weaknesses of each method.
- Interpret and evaluate the results of experiments.
- Choose which method, or combination of methods, is best for answering a research question.
- Show understanding of the different methods and their applications by developing basic studies

WEEKLY ASSIGNMENTS

Reading Assignments and Lectures. Reading assignments and lectures will be posted on the class D2L site. They are all required unless otherwise noted.

To save you the cost of expensive textbooks, all assignments are free – they are chosen from open-source textbooks, from books and journals from the UA library, or from other online sources.

Weekly Quizzes. There will be weekly quizzes to accompany the content each week. These quizzes will help you to check your understanding to prepare for discussions and exams. They will be multiple choice and timed. There will be 6 weekly quizzes. Each is worth 5 points, and your lowest score will be dropped.

Discussions. In 5 of our modules, you will be required to make a discussion post. There will be specific instructions provided for each post. Discussions will often involve generating a research question that you could investigate using the method reviewed that week. You will also need to discuss other details that are important to consider when creating a study (e.g., your variables,

subject assignment, how you present stimuli, etc.). You will also need to respond to a classmate following provided instructions. Each discussion (your post + a response to a classmate) is worth 10 points total, and your lowest score will be dropped. You can find the topics associated with discussion posts in the Course Schedule.

EXAMS

Learning will also be assessed through a **Midterm Exam** and **Final Exam**. These will also be multiple choice and timed. The midterm is worth 25 points and covers the content from the first half of the course. The final exam is worth 30 points, and it will be cumulative. Both exams will be available for multiple days, but once you open an exam you will need to complete it within an identified amount of time.

GRADING

Reading Quizzes (5 graded): 25 points
Discussions (4 graded): 40 points
Midterm Exam: 25 points
Final Exam: 30 points
Total: 120 points

LATE WORK POLICY

The weekly quizzes and discussion posts should be completed by the end of each week. However, there is a grace period, where quiz submissions and discussion posts will be accepted without penalty up until its associated exam. Refer to the d2L course site for final due dates for quizzes and discussions. There will be no makeups allowed for the midterm or final exam.

Final Exam Schedule:

https://registrar.arizona.edu/faculty-staff-resources/room-class-scheduling/schedule-classes/final-exams

Course Policies:

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Absence and Class Participation Policy: Because this is an online course, absence and class participation will be assessed through the completion of required course assignments. Participation in the course is assessed through the completion of the discussions, where you will interact with your classmates in discussion of course material.

Accessibility and Accommodations:
It is the University's goal that learning experiences be as accessible as possible. If you anticipate or experience physical or academic barriers based on disability or pregnancy, please let me know immediately so that we can discuss options. You are also welcome to contact Disability Resources (520-621-3268, email: uadrc@email.arizona.edu , http://drc.arizona.edu/) to establish reasonable accommodations.

Subject to Change Statement:
Information contained in the course syllabus, other than the grade policies, may be subject to change with reasonable advance notice, as deemed appropriate by the instructor. If any changes are made, they will be provided immediately in writing to students via posting to the D2L course website.

Grade appeals:
If you would like to appeal a grade for an exam or assignment, you should do so **within 3 days** from the day the grade was returned to you. Any appeal that does not come within 3 days will not be considered. If you make an appeal, you should state either (a) why you believe your exam or assignment was incorrectly scored, or (b) why you believe your answer to a particular question or item is correct.

Incomplete Grade Policy:
Incomplete grades will be given only in special circumstances as outlined in university policy as stated in "The University of Arizona Record General Academic Manual."

Expected Grading Timeline:
All assignments will be graded within one week of their submission due date.

Student Responsibility for Managing Their Course Progression: Although I try to help guide you through the course, it is ultimately the responsibility of the student to direct their course progress, including following the course schedule, minding due dates, keeping up with required readings, and participating in all class components. All due dates are listed in the syllabus and on the course calendar. If you find that you are having trouble keeping up with course material, please feel free to sign up for Remind text message reminders (more information about how to sign up will be provided via email and posted to the News board at the beginning of the semester).

Course Calendar:

Week	Dates	Topic	Assignments	Submission Deadlines
1	01/10 – 01/16	Experiments and Behavioral Methods	Week 1 Quiz Week 1 Discussion	
2	01/17 - 01/23	fMRI	Week 2 Quiz Week 2 Discussion	
3	01/24 - 01/30	EEG & iEEG	Week 3 Quiz Week 3 Discussion	Weeks 1,2,3 Quizzes and Discussions due **01/30 at midnight**
4	01/31 – 02/06	Midterm	Midterm	Midterm due **02/06 at midnight**
5	02/07 – 02/13	Neuropsychology and Noninvasive Neuromodulation	Week 5 Quiz Week 5 Discussion	
6	02 /14 – 02/20	Psychophysiology	Week 6 Quiz Week 6 Discussion	
7	02/21 – 02/27	Cognitive Modeling	Week 7 Quiz	Weeks 5,6,7 Quizzes and Discussions due **02/27 at midnight**
8	02/28 – 03/02	Final Exam	Final Exam	Final due **03/02 at midnight**

NSCS 344 Fall 2023
University of Arizona
UA Online

Course Instructor:
Sarah Cook, PhD
PAS 556
sarahcook@email.arizona.ed

Office Hours (through zoom)
Tuesdays 3 PM – 4 PM
Thursdays 3 PM – 4 PM

Course TA:
Jingming (Jim) Xue
jingmingxue@email.arizona.edu

Office Hours (through zoom):
Fridays 2PM – 4PM

Course Overview:

The goal of this class is to provide an introduction to the art of computational modeling in Cognitive Science using the MATLAB programming language. Topics will include, how we model learning and simple decisions, how we connect computational models to observed experimental data (such as choices and neural activations) and how we can use modeling to design better experiments to test complex hypotheses.

The class will be very much a "hands on" class, every week students will create a different model. At the end, students should be able to implement a computational model, fit a model to data and determine which of a set of models best fits the observed experimental data.

Course Objectives and Expected Learning Outcomes:

This course will cover the following topics:

1. Models of perceptual decision making, reinforcement learning, and expected value theory
2. Processing behavioral data in MATLAB
3. Fitting computational models with the least squares, Bayesian, and maximum likelihood methods
4. Parameter Recovery

At the end of this course you should be able to:

1. Implement various models of cognitive processes, and simulate data in MATLAB
2. Perform data processing and basic statistical analysis in MATLAB
3. Fit behavioral data in MATLAB and find the best fitting parameters
4. Perform parameter recovery to assess the reliability of the model

Course Materials:

There is no required textbook for this course. All materials necessary for the course will be provided through D2L.

Classroom Format:

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Grading Scheme:

90 – 100%	A
80 – 89%	B
70 – 79%	C
60 – 69%	D
0 – 59%	E

Grading:

1. MATLAB Grader Submissions (10%)

For each module, you will have MATLAB grader submissions to complete. These are short coding checks where you can check your code that you created during the lecture video for errors, before moving on to complete the assignment. **These will be graded based on participation.** Although your grade will initially show in the gradebook based on if your code passed all of the coding checks, you will end up getting full credit for attempting to submit the correct code, *even if it does not pass all of the checks*.

2. Assignments (70 %)

There will be 10 coding assignments to be completed. Your lowest grade on the coding assignments will be dropped. You will be put in groups to complete these assignments and are encouraged to work together to debug your code and complete the assignments. However, you should each submit your own individual code for grading.

3. Portfolio submissions (20 %)

You will also work in groups to complete three separate portfolio submissions. These portfolio submissions are designed to push your understanding of the models, and apply your understanding by creating our own solutions.

4. Extra Credit

The discussion boards on D2L will be used for students to post questions about any coding problems they are getting stuck on. You are encouraged to respond to your classmates with potential solutions and help to answer their questions. Any students who are active on the discussion boards answering questions will receive extra credit towards their final grade.

Late Policy: All of the assignments and portfolio submissions will have associated due dates listed in the course calendar, and on D2L. However, there is a grace period, where you will be able to make corrections and request a regrade within 3 days of receiving your grade. To request a regrade, you should make corrections to your code, and email the TA within 3 days of receiving your grade to request a regrade for your assignment.

Course Policies:

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NSCS 344 Spring 2024
University of Arizona
UA Online

Course Instructor:
Robert Wilson, PhD
bob@arizona.edu

Course Overview:

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