



NEUR 201: Introduction to Neuroscience

Term: Fall 2026

Credits: 4.0

Lecture Times & Location: Monday, Wednesday, Friday 3:00–3:50 p.m., Meridian Science Center 140

Laboratory Time & Location: Thursday 8:00–10:50 a.m., Meridian Science Center 124

Modality: In-Person Lecture and Laboratory

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Instructor Information

- **Instructor:** Dr. Arjun Iyer (Associate Professor of Neuroscience)
- **Email:** aiyer@university.alkimi.ai
- **Office:** Meridian Science Center 238
- **Office Hours:**
 - Wednesday & Friday: 1:00–2:30 p.m. (In person, Meridian Science Center 238)
 - Monday: 11:00 a.m.–12:00 p.m. (Virtual via Zoom; link posted in Canvas)
 - Also available by appointment.

Course Description

Neuroanatomy, neurons and glia, membrane potentials, synaptic transmission, sensory and motor systems, and the neural basis of learning and behavior, with a weekly three-hour laboratory in neuroanatomy and electrophysiology. NEUR 201 is the foundational gateway course for neuroscience majors and pre-health students, exploring the biological mechanisms underlying nervous system function from ion channels to complex cognitive behavior. We examine cellular neurobiology, resting membrane potentials, action potential generation and propagation, neurotransmitter synthesis and synaptic transmission, sensory transduction, motor circuitry, and synaptic plasticity. In the weekly laboratory in Meridian Science Center 124, you will perform sheep brain gross dissections, histological staining of neural tissue, computer simulation of Hodgkin-Huxley kinetics, and extracellular electrophysiology in invertebrate model organisms.

Prerequisites

BIO 101 and CHEM 101.

Measurable Student Learning Outcomes

Upon successful completion of NEUR 201, students will be able to:

1. **Analyze Cellular Neuroanatomy and Glial Functions:** Identify the morphological structures of neurons and glia and differentiate their functional contributions to neural circuit homeostasis and myelination.
2. **Calculate Membrane Potentials and Model Action Potentials:** Apply the Nernst and Goldman-Hodgkin-Katz equations to compute equilibrium potentials and model voltage-gated ion channel conductance during action potentials.

3. **Explain Synaptic Transmission and Neuropharmacology:** Detail vesicle exocytosis, neurotransmitter release, ionotropic versus metabotropic receptor activation, and excitatory/inhibitory postsynaptic potentials.
4. **Trace Sensory and Motor Pathways:** Map the neural architecture of sensory systems (vision, somatosensation, audition) and motor pathways from cortex through basal ganglia and spinal reflexes.
5. **Conduct Neuroanatomy Dissections and Electrophysiology:** Dissect and identify cranial nerves and brain structures in mammalian brains and record action potentials using extracellular electrophysiological instrumentation.
6. **Evaluate Neural Plasticity, Learning, and Memory:** Analyze long-term potentiation (LTP) and long-term depression (LTD) mechanisms in the hippocampus and connect synaptic alterations to memory consolidation.

Required Course Materials & Approximate Costs

1. **Bear, Mark F., Barry W. Connors, and Michael A. Paradiso. *Neuroscience: Exploring the Brain*. 4th ed., Wolters Kluwer, 2016.** Approx. \$65 for digital access; approx. \$130 for print purchase.
2. **NEUR 201 Neuroscience Laboratory Manual (Fall 2026). Alkimi University Copy Center.** Approx. \$20.
3. **Dissection kit with scalpel, fine forceps, blunt probe, and ANSI Z87.1 splash goggles.** Approx. \$25 at campus bookstore.
4. **Total estimated cost:** \$45 to \$175.

Generative AI Policy (AI Level 2: AI Permitted with Disclosure for Specified Tasks)

In accordance with Alkimi University Academic Policies (Student Handbook §5.8), NEUR 201 operates under **AI Level 2**.

- **What is permitted:** You may use AI tools to generate 3D anatomical flashcards, clarify biophysical equations like the Nernst and Goldman-Hodgkin-Katz equations, and proofread draft laboratory write-ups.
- **What is prohibited:** You may not use AI tools to interpret electrophysiological recordings or oscilloscope traces, complete assigned case studies, generate post-lab discussion text, or consult AI during exams.
- **Disclosure:** On each submitted laboratory report and neuroanatomy case study, include a statement identifying any AI tools consulted and detailing your independent verification, or confirm that no AI was used.

Grading Components and Weights

- **Midterm Exam 1:** 15% (In class, Friday, September 25)
- **Midterm Exam 2:** 15% (In class, Friday, October 30)
- **Neuroanatomy & Electrophysiology Lab Reports:** 25% (Weekly laboratory reports due in Canvas Thursdays at 11:59 p.m.)
- **Neurobiology Case Study Project:** 10% (Due Friday, November 20 at 11:59 p.m.)
- **Weekly Canvas Quizzes:** 10% (Pre-lecture Canvas quizzes due Mondays at 11:59 p.m.; lowest two dropped)
- **Final Comprehensive Examination:** 25% (Wednesday, December 16, 2026, 11:30 a.m.–1:30 p.m.)

Grading Scale (Alkimi University Standard)

- **A:** 93–100% | **A-:** 90–92%
- **B+:** 87–89% | **B:** 83–86% | **B-:** 80–82%
- **C+:** 77–79% | **C:** 73–76% | **C-:** 70–72%
- **D+:** 67–69% | **D:** 60–66% | **F:** Below 60%
- **Extra credit:** None is offered.

Course Schedule (Fall 2026)

Week	Dates	Topics & Readings	Laboratory	Assignments & Deadlines
Week 1	Aug 26, 28	Introduction to Neuroscience and Cellular Organization: History of neuroscience, the neuron doctrine, neuronal soma, dendrites, axons, synaptic terminals, and diverse glial subtypes (astrocytes, microglia, oligodendrocytes). <i>Reading: Bear Ch. 1 & 2</i>	<i>No lab meetings this week.</i>	<i>First day of classes: Wed Aug 26.</i>
Week 2	Aug 31–Sep 4	The Neuronal Membrane at Rest and Ion Channels: Phospholipid bilayer, ion channels and pumps, electrical charge, Ohm's law, Nernst equation, and Goldman-Hodgkin-Katz resting membrane potential. <i>Reading: Bear Ch. 3</i>	Lab 1: Mammalian Brain Gross Anatomy and Meninges Dissection.	<i>Wed Sep 2: Add/section change deadline.</i>
Week 3	Sep 9, 11	The Action Potential: Threshold and Propagation: Phases of the action potential, voltage-gated sodium and potassium channels, absolute and relative refractory periods, and saltatory conduction along myelinated axons. <i>Reading: Bear Ch. 4</i>	Lab 2: Sheep Brain Cranial Nerves and Surface Neuroanatomy.	<i>Mon Sep 7: Labor Day (no classes). Wed Sep 9: Census date (last day to drop without a W).</i>
Week 4	Sep 14–18	Synaptic Transmission and Neurotransmitter Release: Electrical gap junctions, chemical synapse ultrastructure, SNARE proteins, calcium-dependent exocytosis, EPSPs, IPSPs, and spatial/temporal summation. <i>Reading: Bear Ch. 5</i>	Lab 3: Sheep Brain Coronal and Sagittal Sectioning.	—
Week 5	Sep 21–25	Neurotransmitter Systems and Receptors & Midterm Exam 1: Acetylcholine, catecholamines, serotonin, amino acid transmitters (glutamate, GABA, glycine), and G-protein coupled receptors; Midterm Exam 1 in class. <i>Reading: Bear Ch. 6</i>	Lab 4: Computer Simulation of Hodgkin-Huxley Action Potential Kinetics.	Midterm Exam 1 (in class).
Week 6	Sep 28–Oct 2	Gross Anatomy and Structural Organization of the Brain: Anatomical axes, forebrain, midbrain, hindbrain, ventricular system, cerebrospinal fluid circulation, meninges, and peripheral cranial and spinal nerves. <i>Reading: Bear Ch. 7</i>	Lab 5: Neuronal Histology and Nissl/ Golgi Staining Microscopy.	—
Week 7	Oct 5–9	The Chemical Senses: Olfaction and Gustation: Taste bud physiology, transduction mechanisms for five basic tastes, olfactory receptor neurons, glomeruli, and olfactory cortex projection maps. <i>Reading: Bear Ch. 8</i>	Lab 6: Extracellular Electrophysiology: Earthworm Giant Axon Conduction Velocity.	—
Week 8	Oct 14, 16	The Eye: Photoreception and Retinal Circuitry: Optical apparatus, photoreceptor rods and cones, phototransduction cascade, rhodopsin, cyclic GMP, on/off center bipolar cells, and ganglion receptive fields. <i>Reading: Bear Ch. 9</i>	Lab 7: Refractory Periods and Temperature Effects on Nerve Conduction.	<i>Oct 12–Oct 13: Fall break (no classes). Fri Oct 16: Midterm grades due.</i>
Week 9	Oct 19–23	Central Visual Pathways and Striate Cortex: Retinofugal projection, lateral geniculate nucleus (LGN) laminations, primary visual cortex (V1), ocular dominance columns, and dorsal/ventral visual streams. <i>Reading: Bear Ch. 10</i>	Lab 8: Invertebrate Neuromuscular Junction Intracellular Recording.	—

Week	Dates	Topics & Readings	Laboratory	Assignments & Deadlines
Week 10	Oct 26–30	Auditory and Vestibular Sensation & Midterm Exam 2: Cochlear mechanics, hair cell stereocilia, tonotopic organization, auditory pathways, semicircular canals, and otolith organs; Midterm Exam 2 in class. <i>Reading: Bear Ch. 11</i>	Lab 9: Sensory Psychophysics: Two-Point Discrimination and Audiometry.	Midterm Exam 2 (in class).
Week 11	Nov 2–6	The Somatosensory System and Pain Processing: Mechanoreceptors of the skin, receptive fields, dermatomes, dorsal column-medial lemniscal pathway, spinothalamic nociceptive pathway, and analgesia. <i>Reading: Bear Ch. 12</i>	Lab 10: Human Electromyography (EMG) and Spinal Reflex Arc Testing.	<i>Fri Nov 6: Last day to withdraw (W) or elect Pass/No Pass.</i>
Week 12	Nov 9–13	Spinal Control of Movement and Motor Units: Lower motor neurons, motor unit recruitment (Henneman's size principle), muscle spindles, gamma motor neurons, Golgi tendon organs, and central pattern generators. <i>Reading: Bear Ch. 13</i>	Lab 11: Electroencephalography (EEG) Rhythms and Evoked Potentials.	—
Week 13	Nov 16–20	Central Motor Control: Cortex and Basal Ganglia: Primary motor cortex (M1), supplementary motor area, basal ganglia direct and indirect pathways, Parkinson's and Huntington's pathology, and cerebellar coordination. <i>Reading: Bear Ch. 14</i>	Lab 12: Behavioral Testing in Rodents: Open Field and Elevated Plus Maze.	Neurobiology Case Study Project due Fri Nov 20 at 11:59 p.m.
Week 14	Nov 23	Chemical Control of the Brain: Autonomic and Diffuse Systems: Sympathetic and parasympathetic divisions, diffuse modulatory systems (noradrenergic, serotonergic, dopaminergic, cholinergic), and psychostimulant actions. <i>Reading: Bear Ch. 15</i>	<i>No lab meetings this week (holiday).</i>	<i>Nov 25–Nov 27: Thanksgiving break (no classes).</i>
Week 15	Nov 30–Dec 4	Motivation, Emotion, and Limbic Circuits: Hypothalamus homeostatic control, reward pathways (mesolimbic dopamine), amygdala fear conditioning circuits, and neurobiology of aggression. <i>Reading: Bear Ch. 16 & 18</i>	Lab 13: Laboratory Practical Examination: Neuroanatomy and Electrophysiology.	—
Week 16	Dec 7, 9	Synaptic Plasticity, Memory Systems, and Course Review: Declarative versus procedural memory, hippocampal synaptic plasticity (LTP and LTD), NMDA receptor coincidence detection, AMPA insertion, and review. <i>Reading: Bear Ch. 24 & 25 & Review</i>	<i>No lab meetings this week (holiday).</i>	<i>Wed Dec 9: Last day of classes. Thu Dec 10: Reading Day.</i>
Finals	Dec 16	Final Comprehensive Examination: Wednesday, December 16, 2026, 11:30 a.m.–1:30 p.m., Meridian Science Center 140.	—	Comprehensive examination covering cellular neurobiology, sensory-motor systems, neuroanatomy, and neural plasticity.

Course Policies

Attendance Policy

Consistent attendance at all lectures and laboratory sessions is essential. Laboratory practicals, brain dissections, and live electrophysiological recordings cannot be made up outside designated section meetings. Notify Dr. Iyer in advance of excused absences. Accumulating more than two unexcused lab

absences results in an administrative failure (F). Students who miss the first two class meetings without notifying the instructor may be dropped. Students may miss class for religious observance without penalty if they notify the instructor in writing within the first two weeks of the semester (by Wednesday, September 9, 2026). Absences for university-sponsored activities (athletics, performances, conferences) are excused with a letter from the sponsoring office at least one week in advance.

Late Work Policy

Laboratory reports submitted after the Thursday deadline lose 10% per day and will not be accepted after Sunday 11:59 p.m. Weekly pre-lecture quizzes close promptly at the deadline with no extensions, but the two lowest quiz grades are automatically dropped at semester end.

Laboratory Safety and Specimen Protocol

Meridian Science Center 124 involves biological tissue dissections and electronic recording equipment. Buttoned lab coats, ANSI Z87.1 splash goggles, nitrile gloves, and closed-toe footwear are mandatory during all dissection sessions. Dispose of all sharps in biohazard puncture-resistant containers.

Final Exam Policy

The final examination (Wednesday, December 16, 2026, 11:30 a.m.–1:30 p.m.) is scheduled by the University Registrar and can't be moved without the Dean's written approval (Faculty Handbook §5.5). A student with three or more final exams on the same calendar day may reschedule one of them. Requests go to the instructor of the middle exam by the last day of classes. For this term, send the request by Wednesday, December 9, 2026 (Student Handbook §6.4).

Academic Integrity

Alkimi University is an academic community devoted to rigorous scholarship, open intellectual inquiry, and uncompromising ethical conduct. All students are subject to the regulations of the Alkimi University Academic Integrity Policy. Academic dishonesty—including plagiarism, cheating on examinations, unauthorized collaboration, fabrication of empirical data, and unauthorized submission of academic work generated by artificial intelligence—undermines the integrity of the university and carries severe disciplinary sanctions. Sanctions range from a failing grade on an assignment or exam to an administrative course failure recorded as an 'XF' on the official transcript, academic suspension, or expulsion. Suspected violations are formally investigated and resolved through the Office of Academic Integrity in accordance with Faculty Handbook §6. For detailed information, consult the Office of Academic Integrity, Lovell Hall 315, (555) 555-0163, integrity@university.alkimi.ai.

Accessibility Services

Alkimi University is committed to providing equitable educational access and reasonable accommodations for all students with documented disabilities, including physical, sensory, psychological, learning, and chronic health conditions. Students requesting academic accommodations must formally register with the Office of Accessibility Services, Harlan Hall 204, (555) 555-0155, access@university.alkimi.ai. Once approved, students will receive an official Faculty Accommodation Letter detailing approved accommodations. Students should present this letter to the instructor as early in the semester as possible, and at least one week prior to any exam or assignment requiring accommodation. Accommodations cannot be applied retroactively.

Student Wellness and Mental Health

Your physical health, psychological well-being, and mental health are essential to your academic success. If you experience heightened stress, anxiety, depressive symptoms, personal trauma, or academic burnout, free, confidential counseling and medical care are available through the Hollis Health & Counseling Center, located in the Hollis Center. Routine appointments are available Monday–Friday 8:00 a.m.–6:00 p.m. and

Saturday 10:00 a.m.–2:00 p.m. during the semester by calling (555) 555-0190 or emailing health@university.alkimi.ai. Urgent, 24/7 crisis psychological counseling is accessible immediately at (555) 555-0199.

Campus Student Support Services

- **Academic Advising Center:** Lovell Hall 101 | (555) 555-0158 | advising@university.alkimi.ai
- **Writing Center:** Whitcombe Library 3rd Floor | Free consultations on papers, reports, and research projects at any stage.
- **Whitcombe Library:** Whitcombe Library, Main Floor | (555) 555-0170 | askalibrarian@university.alkimi.ai
- **Hollis Health & Counseling Center:** Hollis Center | (555) 555-0190 | 24/7 Counseling Line: (555) 555-0199 | health@university.alkimi.ai
- **Science Tutoring Center:** Drop-in peer tutoring and conceptual neuroscience assistance are available Monday through Thursday from 4:00 to 8:00 p.m.