NPB 163 **Spring 2023** **CRN# 52476**
Systems Neuroscience

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Course goals:

Develop an understanding for

- what systems neuroscience is, what kind of scientific questions are being asked, and what experimental techniques are used to address these questions.
- how neurons code information about sensory events or planned actions.
- the problems that need to be solved by sensory and motor systems and how these systems are organized.
- the relationship between structure and function of different parts of the brain (neocortex, basal ganglia, cerebellum).
- neural mechanisms that support the short-term and long-term storage of information.
- neural mechanisms underlying cognitive control and other cognitive functions (e.g., attention, sensorimotor integration, decision-making).

Office hours: Fri, 2:10 – 3:00 PM 183 Briggs

Lectures are Mon and Wed, 2:10 – 3:30 PM in 212 Veihmeyer.
Discussions are Mon and Wed, 3:35 – 4:00 PM in 212 Veihmeyer.

All exam questions will be based on the material covered in the lectures and in the lecture notes. Lecture notes are available at canvas.ucdavis.edu. **Please note that all material that is posted on the Canvas course site is for your use only and not to be publicly distributed** (please see http://sja.ucdavis.edu/cac.html for the UC Davis Code of Academic Conduct).

While lecture notes (copies of the slides) are provided, they only cover the basics. You are encouraged to come to the lectures, LISTEN, TAKE NOTES, participate, and THINK about what was covered in the lecture (when you get back to your own notes or have a look at the posted lecture notes). It is also always a good idea to come to the office hours if you have questions about the material.

Our office hours are shown above. You can also send emails with questions to jditterich@ucdavis.edu or xmch@ucdavis.edu. We won't always be able to answer emails immediately, but we will get back to you as soon as possible.

Grading: The grade is based on a midterm (33%) and a comprehensive final (67%). The exams will require you to demonstrate that you have understood the material that was presented in the lectures and in the notes and that you can USE THIS INFORMATION to solve new problems. The course will be letter graded.

Missed exam policy: The **only acceptable excuses for missed exams** are being sick on the day of the exam (doctor's note stating that you were unable to take the exam **required**) or a family emergency (like a funeral or the birth of a child; proof **required**). In this case a makeup exam will be offered. Otherwise, the score for the missed exam will be zero points.

Used text: Kandel et al.: Principles of Neural Science (4th, 5th, or 6th Edition; the two latest editions are available as an electronic resource through the university), McGraw-Hill and selected articles

Background reading (5th Ed chapter #/6th Ed chapter #; the chapter numbers for the 4th Edition would again be different, but the chapter titles are similar):

Sensory Systems:
Chapter 21/17: Sensory Coding
Chapter 25/21: The Constructive Nature of Visual Processing
Chapter 26/22: Low-Level Visual Processing: The Retina
Chapter 27/23: Intermediate-Level Visual Processing and Visual Primitives
Chapter 28/24: High-Level Visual Processing: Cognitive Influences (From Vision to Cognition)

Motor Systems:
Chapter 33/30: The Organization and Planning of Movement (Principles of Sensorimotor Control)
Chapter 39/35: The Control of Gaze
Chapter 34/31: The Motor Unit and Muscle Action
Chapter 35/32: Spinal Reflexes (Sensory-Motor Integration in the Spinal Cord)
Chapter 37/34(a): Voluntary Movement: The Primary Motor Cortex (Motor Cortices)
Chapter 38/34(b): Voluntary Movement: The Parietal and Premotor Cortex (Motor Cortices)

Cerebellum:
Chapter 42/37: The Cerebellum

Basal Ganglia:
Chapter 43/38: The Basal Ganglia

Schedule

Lecture 1:	4/3/23	(Mon)	
Lecture 2:	4/5/23	(Wed)	
Lecture 3:	4/10/23	(Mon)	
Lecture 4:	4/12/23	(Wed)	
Lecture 5:	4/17/23	(Mon)	
Lecture 6:	4/19/23	(Wed)	
Lecture 7:	4/24/23	(Mon)	
Lecture 8:	4/26/23	(Wed)	
Lecture 9:	5/1/23	(Mon)	
Midterm	**5/3/23**	**(Wed)**	**Covers Lectures 1-9** **33% of grade**
Lecture 10:	5/8/23	(Mon)	
Lecture 11:	5/10/23	(Wed)	
Lecture 12:	5/15/23	(Mon)	
Lecture 13:	5/17/23	(Wed)	
Lecture 14:	5/22/23	(Mon)	
Lecture 15:	5/24/23	(Wed)	
Lecture 16:	5/31/23	(Wed)	
Lecture 17:	6/5/23	(Mon)	
Lecture 18:	6/7/23	(Wed)	

Comprehensive Final Exam **Thursday, 6/15/23, 6:00 PM – 8:00 PM**
Covers Lectures 1-18
67% of grade