SCAN Foundations

PSYCH 511.003 Spring 2025

2025-01-06

Figure 1: Source: https://www.brainfacts.org/neuroscience-in-society/law-economics-and-ethics/2019/neuroethics-asks-the-difficult-questions-031319

Instructor

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Meeting Location and Time

467 Moore Thursdays, 1-3 PM.

About the course

The first scientific psychologists were physiologists fascinated by the possibility of understanding the mind by studying the brain. In this course, we will explore the historical roots and contemporary challenges associated with the study of biological approaches to complex adaptive behavior. In doing so, we will read and examine critically primary source readings that discuss basic patterns and processes of brain structure and function. The goal is to provide students with a basic foundation of knowledge about the structures and functions of the nervous system that can provide the basis for future study.

This course is one of two required courses for the Specialization in Cognitive and Affective Neuroscience (SCAN).

Prerequisites

Undergraduate coursework in neuroscience or physiological psychology such as the equivalents of PSYCH 260 or BIO 469/470.

January 13-17

Thursday, January 16

Topics

- Structure of the course
- Levels of analysis
- Causality in brain and behavior
- Does neuroscience need behavior? If so, what does psychology need?

Readings

- 1.
- 2.
- Optional: Parada and Rossi (2018).
- Optional: Churchland and Sejnowski (1988).
- Optional: Favela (2020).

Materials

- Slides
- Exercise 01 assigned

January 20-24

Wednesday, January 22

- Exercise 01 write-up due.

Thursday, January 23

Topics

- Neuroanatomy lab

Readings

- Neuroanatomy notes

Materials

- Slides
- Allen Brain Atlas.
- Exercise 02 distributed

January 27-31

Wednesday, January 29

- Exercise 02 image due.

Thursday, January 30

Topics

- Cellular neuroscience I
  - Anatomy
  - Physiology
    - Resting potential

Readings

- Cellular neuroscience notes
- Optional: Zeng and Sanes (2017).
- Optional: Oliveira et al. (2015).
- Optional: Distéfano-Gagné et al. (2023).

Materials

- Slides
- Exercise 03 distributed.

February 3-7

Thursday, February 06

Topics

- Cellular neuroscience II
  - Action potential
  - Synaptic transmission
- Exercise 04 assigned

Readings

- Cellular neuroscience notes

Materials

- Slides

February 10-14

Wednesday, February 12

- Exercise 03 write-up due.

Thursday, February 13

Topics

- Neurochemistry
  - Neurotransmitters
  - Hormones
- Neurocomputing

Readings

- Neurochemistry notes
- Optional: Sarkar et al. (2016).

Materials

- Slides
- Exercise 05 distributed

February 17-21

Wednesday, February 19

- Exercise 04 write-up due.

Thursday, February 20

Topics

- Methods in neuroscience

Readings

- Methods notes
- Watch: (MITCBMM 2019)
- Review: ("Cognitive Psychology and Cognitive Neuroscience/Behavioural and Neuroscience Methods," n.d.).
- Recommended: (Cohen 2017).
- Recommended: (Hillman 2014).
- Optional: (Koch et al. 2022).

Materials

- Notes
- Exercise 06 distributed.

February 24-28

Wednesday, February 26

- Exercise 05 write-up due.

Thursday, February 27

Topics

- Evolution of the nervous system

Readings

- evolution resources
- (Charvet and Finlay 2012)
- (Hofman 2014)
- Optional: (Castrillon et al. 2023).

Materials

- Notes
- Exercise 07 distributed

March 3-7

Wednesday, March 05

- Exercise 06 write-up due.

Thursday, March 06

Topics

- Development of the nervous system

Readings

- Methods notes
- (Cao, Huang, and He 2017).
- (Blumberg and Adolph 2023).
- Optional: (Larsen et al. 2023).
- Optional: (Rakic 2009).

Materials

- Notes
- Exercise 08 distributed

March 10-14 ***Spring Break***

March 17-21

Thursday, March 20

March 24-28

Thursday, March 27

March 31 - April 4

Thursday, April 03

April 7-11

Thursday, April 10

April 14-18

Thursday, April 17

April 21-25

Thursday, April 24

April 28 - May 2

Thursday, May 01

References

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Larsen, Bart, Valerie J Sydnor, Arielle S Keller, B T Thomas Yeo, and Theodore D Satterthwaite. 2023. "A Critical Period Plasticity Framework for the Sensorimotor-Association Axis of Cortical Neurodevelopment." *Trends in Neurosciences* 46 (10): 847–62. https:

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