

# SCAN Foundations

PSYCH 511.003 Spring 2025

2025-01-08

## Foundations of Social, Cognitive, and Affective Neuroscience (SCAN)

### Instructor

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### Meeting Location and Time

467 Moore Thursdays, 1-4 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

- Required:
  - Krakauer et al. (2017)
  - Parada and Rossi (2018)
- Optional:
  - Siddiqi et al. (2022)
  - Churchland and Sejnowski (1988)
  - Favela (2020)
  - Ross and Bassett (2024)

#### Materials

- [Slides](#)
- [Exercise 01](#) assigned | [PDF](#) |

## January 20-24

### Wednesday, January 22

- [Exercise 01](#) write-up due | [Canvas dropbox](#) |

## Thursday, January 23

### Topics

- Neuroanatomy lab

### Readings

- [Neuroanatomy notes](#)

### Materials

- [Slides](#). [PDF](#)
- [Allen Brain Atlas](#).
- [Exercise 02](#) distributed | [PDF](#) |

## January 27-31

### Wednesday, January 29

- [Exercise 02](#) due | [Canvas dropbox](#) |

### Thursday, January 30

### Topics

- Cellular neuroscience I
  - Anatomy
  - Physiology
    - \* Resting potential

### Readings

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

## Materials

- [Slides](#) | [PDF](#) |
- [Exercise 03](#) distributed. | [PDF](#) |

## February 3-7

### Thursday, February 06

#### Topics

- Cellular neuroscience II
  - Action potential
  - Synaptic transmission
- [Exercise 04](#) assigned. | [PDF](#) |

#### Readings

- [Cellular neuroscience notes](#)

## Materials

- [Slides](#)

## February 10-14

### Wednesday, February 12

- [Exercise 03](#) write-up due. | [Canvas dropbox](#) |

### Thursday, February 13

#### Topics

- Neurochemistry
  - Neurotransmitters
  - Hormones
- Neurocomputing

## Readings

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

## Materials

- [Slides](#)
- [Exercise 05](#) distributed | [PDF](#) |

## February 17-21

### Wednesday, February 19

- [Exercise 04](#) write-up due | [Canvas dropbox](#) |

### 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)
  - Hillman (2014)
- Optional:
  - Koch et al. (2022)

## Materials

- Notes
- [Exercise 06](#) distributed | [PDF](#) |

## **February 24-28**

### **Wednesday, February 26**

- [Exercise 05](#) write-up due | [Canvas dropbox](#) |

### **Thursday, February 27**

#### **Topics**

- Evolution of the nervous system

#### **Readings**

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

#### **Materials**

- Slides
- [Exercise 07](#) distributed | [PDF](#) |

## **March 3-7**

### **Wednesday, March 05**

- [Exercise 06](#) write-up due | [Canvas dropbox](#) |

### **Thursday, March 06**

#### **Topics**

- Development of the nervous system

## Readings

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

## Materials

- Notes
- [Exercise 08](#) distributed | [PDF](#) |

**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**

**Topics**

- Beethoven and the Cerebral Symphony

**May 4-9**

**Thursday, May 08**

- [Final Project](#) write-up due | Canvas dropbox



## References

- Blumberg, Mark S, and Karen E Adolph. 2023. "Protracted Development of Motor Cortex Constrains Rich Interpretations of Infant Cognition." *Trends in Cognitive Sciences* 27 (3): 233–45. <https://doi.org/10.1016/j.tics.2022.12.014>.
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- Castrillon, Gabriel, Samira Epp, Antonia Bose, Laura Fraticelli, André Hechler, Roman Belenya, Andreas Ranft, et al. 2023. "An Energy Costly Architecture of Neuromodulators for Human Brain Evolution and Cognition." *Science Advances* 9 (50): eadi7632. <https://doi.org/10.1126/sciadv.adi7632>.
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- Churchland, P S, and T J Sejnowski. 1988. "Perspectives on Cognitive Neuroscience." *Science* 242 (4879): 741–45. <https://www.ncbi.nlm.nih.gov/pubmed/3055294>.
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