

# **SCAN Foundations**

**PSYCH 511.003 Spring 2025**

2025-12-05

## **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)
  - Distefano-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**

- 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**

- [Methods 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**

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

## **March 3-7**

### **Wednesday, March 05**

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

### **Thursday, March 06**

#### **Topics**

- Development of the nervous system

## **Readings**

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

## **Materials**

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

**March 10-14 Spring Break**

**March 17-21**

**Wednesday, March 19**

- [Exercise 07 write-up due](#) | [Canvas dropbox](#) |

**Thursday, March 20**

**NO CLASS**

**March 24-28**

**Wednesday, March 26**

- [Exercise 08 write-up due](#) | [Canvas dropbox](#) |

**Thursday, March 27**

## **Topics**

- Perception & action

## **Readings**

- Khalsa et al. (2018)
- Shenoy, Sahani, and Churchland (2013)

## **Materials**

- Perception notes
- Action notes

**March 31 - April 4**

**Thursday, April 03**

## **Topics**

- Cognition & Language

## **Readings**

- Miller and Cohen (2001)
- Tuckute, Kanwisher, and Fedorenko (2024)

## **Materials**

- Notes

**April 7-11**

**Thursday, April 10**

## **Topics**

- Neuroscience of emotion

## **Readings**

- Malezieux, Klein, and Gogolla (2023)
- Watabe-Uchida, Eshel, and Uchida (2017)

## **Materials**

- [Notes](#)

## **April 14-18**

**Thursday, April 17**

### **Topics**

- Disorder & disease I

### **Readings**

- Howes, Bukala, and Beck (2023)
- Volk et al. (2015)

## **Materials**

- [Notes](#)

## **April 21-25**

**Thursday, April 24**

### **Topics**

- Disorder & disease II

### **Readings**

- Moncrieff et al. (2022)
- Namkung, Kim, and Sawa (2017)

## **Materials**

- [Notes](#)

**April 28 - May 2**

**Thursday, May 01**

### **Topics**

- Student presentations
  - Madison Miles: *A brief overview of psychotropic medications*
  - Yifei Gong: *When meaning shifts and language switches: Investigating the role of domain-general inhibitory control in bilingual prediction errors*
- Beethoven and the Cerebral Symphony

### **Materials**

- [Slides](#)

**May 4-9**

**Thursday, May 08**

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

### **References**

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- Khalsa, Sahib S, Ralph Adolphs, Oliver G Cameron, Hugo D Critchley, Paul W Davenport, Justin S Feinstein, Jamie D Feusner, et al. 2018. “Interception and Mental Health: A Roadmap.” *Biological Psychiatry: Cognitive Neuroscience and Neuroimaging* 3 (June): 501–13. <https://doi.org/10.1016/j.bpsc.2017.12.004>.
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