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

- 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

- Beethoven and the Cerebral Symphony
- Student presentations

May 4-9

Thursday, May 08

- Final Project write-up due | Canvas dropbox

References

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