

Interdisciplinary Approaches to Neuroscience II (NEUR 543)

Spring 2020

When and Where: Beckman Institute (room 3269), Mondays, Wednesdays, and Fridays from 5-5:50 PM.

Course Coordinator: Justin Rhodes, jrhodes@illinois.edu, 503-413-9241

Course Description: Interdisciplinary Approaches to Neuroscience II is the second of a two-part course series that is required for all first year graduate students in the Neuroscience Program (NSP). The purpose of the course is to introduce students to the breadth and inter-disciplinary nature of the field, and to the topic areas investigated broadly by faculty of the NSP. The course emphasizes concepts and methods rather than facts, and includes discussions and an oral presentation by the students to the class on a paper from their laboratory. The course is team taught by multiple NSP faculty, senior students and postdocs. The course includes topics in cellular and molecular neuroscience, and computational neuroscience and neuroengineering. It also continues covering topics in behavioral and clinical neuroscience from the first semester. All first year graduate students in NSP are also involved in developing their independent research program. The second part of the course has each student present a paper that was published by their mentor and covers aspects of the research area that they are starting to work on.

Requirements: Attendance is mandatory. All first year NSP graduate students are required to take NEUR 542 and 543 their first year in sequence. Prerequisites: NEUR 542 or consent of the instructor. Students are expected to have a general background knowledge in one or more of the following areas related to the field of neuroscience: biology, chemistry, psychology, physics or engineering.

Website: An Illinois Compass 2g website at <https://compass2g.illinois.edu/> has been established for the course. Lecture slides and reading materials will be posted there. You will also need to go to the site to complete weekly quizzes. You will need your Net ID and AD password to access the site.

Required Reading: Some units have required reading and others do not. Required readings will be posted on the Compass website in the instructor's folder. All required readings are listed below the schedule. Students are expected to read the material posted for the unit before or during the week the material is being presented (see below).

Grading: Your grade in this class will be determined based on weekly multiple choice or short answer quizzes (posted online) one "perspective" paper, and an oral presentation. The assignments will be weighted as follows:

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| Quizzes (10) | 10 points each x 10 = 100 pts |
| Oral presentation (1) | 100 pts |

Quizzes: There will be 10 total quizzes based on the weekly lecture material and readings. The format for the quizzes will vary from week to week depending on the instructor, but typically include 3-5 multiple choice questions or short answers. The quizzes will be posted on the website on Monday following each week of lectures, and students are expected to work on the quizzes independently and post their answers by Friday, midnight of that week.

Oral presentation: The student will prepare a 30 min presentation including at least 10 power point slides but no more than 30. The presentation should be on an original article (not a review article) coming from the laboratory where the student is currently working. If the student is not currently working in a laboratory, then they can present an article of their choosing but must get it approved by the instructor first. The first slide should show the title of the article, year it was published, journal it was published in, and the list of authors. The presentation should include an overall introduction and explanation of the context of the work, including clearly articulating the research question or gap in the literature that the study fills. The talk should also include the methods that were used, and at least one slide with a graph or table of results. The talk should end with the conclusions that the authors drew from the study (how did the study fill the gap or answer the question that was posed), and identify any weaknesses or limitations in the study design or interpretations. The talk will be followed by a question session by the audience and critique by the instructor, and will be graded based on clarity of the slides, overall quality of the presentation, whether the gap in the knowledge base was clearly described, whether the results were clearly described, whether the conclusions were appropriate and weaknesses or limitations acknowledged.

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| Grading Scale | A+ | A | A- | B+ | B | B- |
| | 98-100% | 93 -97% | 90-92% | 88-89% | 83-87% | 80-82% |
| C+ | C | C- | D+ | D | D- | F |
| 78-79% | 73-77% | 70-72% | 68-69% | 63-67% | 60-62% | 0-59% |

Learning Outcomes

This course will cover diverse topics that change on a weekly basis, each week has one to several learning objectives. The following are three examples of learning outcomes from the first 4 weeks of the course: 1) By the end of the week, students will be able to define a stem cell, and understand how somatic cells can be coerced into being stem-cell like, and the advantages for medicine, 2) Understand the genetic abnormality in fragile X syndrome, and the role of the implicated protein in cellular function, 3) Understand how neurons grow axons and dendrites, and the way in which specific chemicals signal parts of the cell to grow.

Statement on Academic Integrity

According to the Student Code, 'It is the responsibility of each student to refrain from infractions of academic integrity, from conduct that may lead to suspicion of such infractions, and from conduct that aids others in such infractions.' Please know that it is my responsibility as an instructor to uphold the academic integrity policy of the University, which can be found here: http://studentcode.illinois.edu/article1_part4_1-401.html

DRES accommodations: To insure that disability-related concerns are properly addressed, students who require assistance to participate in this class are asked to see the head instructor within the first two weeks of the start of the semester. Furthermore, you must make arrangements for special accommodations through DRES (Division of Disability Resources and Educational Services).

TOPICS IN CELLULAR AND MOLECULAR NEUROSCIENCE

Neural Stem Cells

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| Jan 20 | no class (MLK day) | |
| Jan 22 | Lori Raetzman | Neural stem cell maintenance and function |
| Jan 24 | Lori Raetzman | Using stem cells to treat neurologic disease |

Developmental Neuroscience

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|--------|----------------|------------------------------------|
| Jan 27 | Nate Schroeder | Axon and dendrite guidance |
| Jan 29 | Nate Schroeder | Properties of growth cone dynamics |
| Jan 31 | Nate Schroeder | Axon/dendrite degeneration |

Psychoneuroimmunology

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|-------|-----------------|--|
| Feb 3 | Keith W. Kelley | Neuroscience and Immunology: Joined at the Hip |
| Feb 5 | Keith W. Kelley | Chronic Inflammation and Mental Health |
| Feb 7 | Keith W. Kelley | Psychoneuroimmunology in the Clinic: The Immunophysiology Connection |

Xtopic to be decided

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| Feb 10 | Bob McCusker |
| Feb 12 | Bob McCusker |
| Feb 14 | Bob McCusker |

Open

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| Feb 17 |
| Feb 19 |
| Feb 21 |

Neurotransmitters

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| Feb 24 | James Checco | Neuropeptides |
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Feb 26 James Checco Analytical techniques to study neuropeptides
Feb 28 Peter Andersen Recent advances in neuropeptide research

MORE TOPICS IN BEHAVIORAL & CLINICAL NEUROSCIENCE

Xtopic to be decided

Mar 2 Aron Barbey
Mar 4 Aron Barbey
Mar 6 Aron Barbey

Xx Animal Behavior

Mar 9 Alison Bell
Mar 11 Alison Bell
Mar 13 Alison Bell

Mar 16 Spring Break (no class)
Mar 18 Spring Break (no class)
Mar 20 Spring Break (no class)

Clinical Topics/Cognitive Disorders

Mar 23 Dan Llano Translational neuroscience
Mar 25 Dan Llano Cognitive disorders I
Mar 27 Dan Llano Cognitive disorders II

Auditory Cognitive Neuroscience

Mar 30 Fatima Husain Auditory neuroscience
Apr 1 Fatima Husain Hearing disorders
Apr 3 Bahar Shahsavarani Resting state fMRI in hearing disorders

Cellular Neurobiology

Apr 6 Nien-Pei Tsai Introduction to synapse
Apr 8 Nien-Pei Tsai From synapse to system physiology
Apr 10 Kathryn Jewett Synaptic dysfunction

Exercise-brain interactions

Apr 13 Justin Rhodes – functional significance of exercise-induced hippocampal neurogenesis
Apr 15 Justin Rhodes – origins of exercise- brain interactions part 2
Apr 17 Dominika Pindus - Issues in physical activity measurement in the study of neurocognitive health

Oral presentations

Apr 20
Apr 22
Apr 24

Oral presentations continued

Apr 27
Apr 29
Apr 31

Oral presentations continued

Apr 2
Apr 4
Apr 6