

Course Syllabus – NEURO 550

Course Information

Course Number: NEURO 550 FA22

Course Name: Neurobiology of Alcohol and Drug Addiction

Term: FA 2022

Start Date: 09/07/2022

End Date: 12/09/2022

Meeting Days / Times

Mondays and Wednesdays, 1:15-2:45pm PT / 4:15-5:45pm ET

(See Calendar in Canvas for the most up-to-date schedule.)

Location

CA: Graduate Office Large Conference Room (Hazen Theory Building)

FL: B387

Online via Zoom

Course Managers

Role	Last Name	First Name	Email Address
Course Director	Mason	Barbara	mason@scripps.edu
Course Director	Zorrilla	Eric	ezorrill@scripps.edu
TA	Park	Scarlet	jpark@scripps.edu
TA	Shankar	Kokila	kokila@scripps.edu

Course Description

This course focuses on neural circuits and neurosignaling mechanisms that subserve healthy brain function and how long-term drug exposure or genetic/epigenetic factors can dysregulate these mechanisms, leading to the psychopathology of addiction. Lectures cover multiple levels of neuroscientific analysis, including molecular, genetic, synaptic plasticity, neurocircuitry, neuropharmacology and behavioral analysis in both laboratory animals and humans. The neuropsychopharmacology of all major classes of abused substances will be covered. Translational topics in relapse and medications development for addiction will be covered.

Program Learning Outcomes

By the end of the program, students will have accomplished these objectives:

PLO1: Original Research – graduate students are expected to develop the skills critical for generating high-quality research output. This would include absorbing, recalling, and contextualizing scientific knowledge, evaluating scientific information and data, creating testable hypotheses and investigating hypotheses, mastering scientific tools and techniques, displaying ethical behavior, and receiving and giving feedback.

PLO2: Communication – graduate students are expected to demonstrate the oral, written, and media skills to effectively communicate the impact of a study or a body of work to the greater scientific community and to the public at large using a number of methods.

PLO3: Critical Thinking – graduate students are expected to develop a self-directed process to analyze information, form opinions or judgments, and use this process to improve the quality of their scientific thoughts, navigate problems, and make informed decisions.

PLO4: Intellectual Curiosity – graduate students are expected to acquire the capacity to build their intellectual curiosity and demonstrate problem solving approaches that serve their professional growth and ability to impact a field.

PLO5: Career and Professional Development – graduate students are expected to develop a variety of transferable skillsets throughout their graduate experience, including management and leadership, inclusiveness, resilience, scientific rigor, collaboration, accountability, time management, teamwork, networking, and career planning.

Course Learning Outcomes

Upon completion of this course students will be able to:

CLO1: Understand the basic concepts of addiction.

CLO2: Appreciate the impact of dysregulated neural function on broad aspects of cognitive function, motivation, self-control and emotional functioning, e.g. sleep and mood in addiction.

CLO3: Establish a basic understanding of emerging scientific fields germane to systems approaches in neurobiology, e.g., optogenetics and pharmacogenetics, recombinatorial approaches, whole-brain imaging.

CLO4: Understand the strengths and limitations of various experimental approaches for studying the systems level impact of aberrant neural function.

CLO5: Introduction to a wide array of technical research skills used in the neurobiology of addiction ranging from molecular to synaptic to systems and neural circuits to whole animal function. Translation from cells to animals to humans will be emphasized across lectures.

CLO6: Identify specific experimental results; formulate them into important new questions; Design experiments to answer these questions and devise alternative approaches to each definitive conclusion. Journal club discussion and lectures will be designed to meet these criteria.

CLO7: Develop succinct presentation skills; describe the background, questions addressed, approach, conclusions, as well as strengths and weaknesses of scientific papers.

Background Preparation (Prerequisites)

Neuroscience-based courses are recommended but not required.

Pre-reading of the book, *Drugs, Addiction, and the Brain* by Koob, Arends and Le Moal (2014) is recommended (ISBN: 978-0123869371). Institute will obtain electronic licenses of this book.

Many lectures have associated assigned reading of chapters, journal articles or reviews. It is highly recommended that students read the assigned material before the class.

Course Materials

Required PDFs of journal club articles will be provided in Canvas.

Reference texts: Institute will obtain electronic licenses of these references.

Koob, Arends and Le Moal (2014) *Drugs, Addiction, and the Brain* (ISBN: 978-0123869371)

Koob, Arends, McCracken, Le Moal (2020) *Neurobiology of addiction series, v.1: Introduction to Addiction: Addiction, Animal Models, and Theories* (ISBN: 978-0128168639)

Koob, Arends, McCracken, Le Moal (2020) *Neurobiology of addiction series, v.2: Psychostimulants* (ISBN:978-0128169902)

Koob, Arends, McCracken, Le Moal (2021) *Neurobiology of addiction series, v.3: Alcohol* (ISBN: 978-0128167939)

Attendance Statement

Students are expected to attend all classes. Students who cannot attend class must seek prior permission for an excused absence from the course director or teaching assistant. Unapproved absences may result in a lower attendance grade, and three or more unapproved absences may result in an “incomplete” for the course. Students who miss a class should arrange to get notes from a fellow student and are strongly encouraged to meet with a teaching assistant to obtain missed material.

Scientific and Professional Ethics

The work you do in this course must be your own. Feel free to build on, react to, criticize, and analyze the ideas of others but, when you do, make it known whose ideas you are working with. You must explicitly acknowledge when your work builds on someone else's ideas, including ideas of classmates, professors, or authors. If you have questions on when or how to distinguish between others' work and your own, please ask the course instructors for guidance. Exams must be completed independently. Any collaboration, sharing or co-opting of answers to exams, unless expressly permitted, may result in an automatic failing grade and possible expulsion from the Graduate Program.

Technology Requirements and Support

For Canvas issues, please contact the Graduate Office by email at: gradprgm@scripps.edu or by phone at: 858-784-8469.

Course Grading

Grading is in accordance with the academic policies of the Skaggs Graduate School. The breakdown of grading is as follows:

- Attendance and general lecture participation and discussions: 25%
- Journal club work: 25%
- Midterm: 25%
- Final Exam: 25%

Letter Grade	Percent	GPA	Description
A	93-100	4.00	Outstanding achievement. Student performance demonstrates full command of the course subject matter and evinces a high level of originality and/or creativity that far surpasses course expectations.
A-	90-92	3.67	Excellent achievement. Student performance demonstrates thorough knowledge of the course subject matter and exceeds course expectations by completing all requirements in a superior manner.
B+	87-89	3.33	Very good work. Student performance demonstrates above-average comprehension of the course subject matter and exceeds course expectations on all tasks as defined in the course syllabus. There is notable insight and originality.
B	83-86	3.00	Satisfactory work. Student performance meets designated course expectations and demonstrates understanding of the course subject matter at an acceptable level.
B-	80-82	2.67	Marginal work. Student performance demonstrates incomplete understanding of course subject matter. There is limited perception and originality.
C+	77-79	2.33	Unsatisfactory work. Student performance demonstrates incomplete and inadequate understanding of course subject matter. There is severely limited or no perception or originality. Course will not count toward degree.
C	73-76	2.00	Unsatisfactory work. Student performance demonstrates incomplete and inadequate

			understanding of course subject matter. There is severely limited or no perception or originality. Course will not count toward degree.
P	73-100	0.00	Satisfactory work. Student performance demonstrated complete and adequate understanding of course subject matter. Course will count toward degree.
F	0-72	0.00	Unacceptable work/Failure. Student performance is unacceptably low level of knowledge and understanding of course subject matter. Course will not count toward degree. Student may continue in program only with permission of the Dean.
I		0.00	Incomplete is assigned when work is of passing quality but is incomplete for a pre-approved reason. Once an incomplete grade is assigned, it remains on student's permanent record until a grade is awarded.
W		0.00	Withdrew from the course with Dean's permission beyond the second week of the term.

- All courses will be recorded and maintained in the student's permanent academic record; only courses that apply towards the degree will appear on the academic transcript. Non-credit or audited courses will not appear on the transcript.
- 4 core courses taken for a letter grade (pass = B- or higher for a core course)
- 2 elective courses taken pass/fail (pass = A, B, C for an elective)

Because students are encouraged to take electives outside their area of expertise, a "C" letter grade is passing.

Course Schedule:

Date	Details
Mon Sep 5, 2022	Labor Day (No Class)
Wed Sep 7, 2022	Course overview (Zorrilla/Mason)
Fri Sep 9, 2022	Grad Student Symposium (No Class)
Mon Sep 12, 2022	What is addiction (Koob)
Wed Sep 14, 2022	Animal models (Roberts)
Mon Sep 19, 2022	Neuroanatomy/neurocircuits (George)
Wed Sep 21, 2022	Synaptic mechanisms of addiction (Roberto)
Sun Sep 25, 2022	JC 1 - Synaptic mechanisms
Mon Sep 26, 2022	JC: Synaptic mechanisms of addiction (Roberto)
Wed Sep 28, 2022	Neuropharmacology: Principles and molecular targets of drugs of abuse (Contet)
Sun Oct 2, 2022	JC 2 - Neuropharmacology
Mon Oct 3, 2022	JC: Neuropharmacology of opioids - "biased" ligands (Bohn)
Wed Oct 5, 2022	Recombinatorial dissection of circuits and molecular targets (Ye)
Mon Oct 10, 2022	Stem cells/neurogenesis (Mandyam)
Wed Oct 12, 2022	Epigenetics (Miller)
Mon Oct 17, 2022	Alcohol (Koob)
Tue Oct 18, 2022	JC 3 - Whole brain imaging
Wed Oct 19, 2022	JC: Whole-brain imaging of addiction - alcohol focus (George)
Mon Oct 24, 2022	Nicotine/tobacco (Cruz/Roberto)
Wed Oct 26, 2022	Cannabinoids/synthetic drugs (Nguyen)
Sun Oct 30, 2022	JC 4 - Cannabinoids
Mon Oct 31, 2022	JC: Cannabinoids/synthetic drugs (Nguyen)
Wed Nov 2, 2022	Pain and Anaesthetics (Hansen)
Sun Nov 6, 2022	JC 5 - Pain
Mon Nov 7, 2022	JC: Pain and Anaesthetics (Hansen)
Wed Nov 9, 2022	Opioids (Contet)
Sun Nov 13, 2022	JC 6 - Opioids
Mon Nov 14, 2022	JC: Opioids (Martemyanov)
Wed Nov 16, 2022	Cocaine/Psychostimulants (Martemyanov)
Sun Nov 20, 2022	JC 7 - Methamphetamine
Mon Nov 21, 2022	JC: Methamphetamine (Miller)
Wed Nov 23, 2022	Food (Zorrilla)
Thu Nov 24, 2022	Thanksgiving Holiday (No Class)
Fri Nov 25, 2022	Thanksgiving Holiday (No Class)
Mon Nov 28, 2022	Neurobiology of relapse / reinstatement (Martin-Fardon)
Wed Nov 30, 2022	JC: Relapse/reinstatement to alcohol (Matzeu)
Sun Dec 4, 2022	JC 8 - Relapse
Mon Dec 5, 2022	Medications development for alcohol use disorder (Mason)
Wed Dec 7, 2022	Course review (Zorrilla)
Mon Dec 12, 2022	Final Exam

