Course Syllabus – NEURO 550

Course Information

Course Number: NEURO 550 FA20
Course Name: Neurobiology of Alcohol and Drug Addiction
Term: FA 2020
Start Date: 09/09/2020
End Date: 12/11/2020

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

Online via Zoom

Course Managers

Role	Last Name	First Name	Email Address
Instructor	Mason	Barbara	mason@scripps.edu
Instructor	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 neurosignalling 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 and 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: Critique peer-reviewed publications
PLO2: Understand approaches and methodologies needed for complex scientific questions in addiction.
PLO3: Knowledgeable of a wide array of technical research skills used in neurobiology of addiction
PLO4: Display strong communication skills

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: Acquire knowledge of techniques in the analysis of neural function 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 text: Institute will obtain electronic licenses of these references.

Koob, George F. & Le Moal, Michel (2005). *Neurobiology of addiction*. ISBN: 978-0124192393

with multi-volume update, in progress

Koob, Arends, McCracken, Le Moal (2020). *Neurobiology of addiction series (book series)*

v.1: Introduction to Addiction: Addiction, Animal Models, and Theories. ISBN: 978-0128168639

v2: Psychostimulants. ISBN: 978-0128169902

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: 30%
- Journal club work: 35%
- Final Exam: 35%

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 7, 2020	Labor Day (No Class)
Wed Sep 9, 2020	Course overview (Mason/Zorrilla)
Fri Sep 11, 2020	Graduate Student Symposium (No Class)
Mon Sep 14, 2020	What is addiction (Koob)
Wed Sep 16, 2020	Animal models (Roberts)
Mon Sep 21, 2020	Neuroanatomy/neurocircuits (George)
Wed Sep 23, 2020	Synaptic mechanisms of addiction (Kirson/Roberto)
Mon Sep 28, 2020	JC: Synaptic mechanisms of addiction (Wolfe/Roberto)
Wed Sep 30, 2020	Neuropharmacology: Principles and molecular targets of drugs of abuse (Contet)
Mon Oct 5, 2020	JC: Neuropharmacology of opioids - "biased" ligands (Bohn)
Wed Oct 7, 2020	Recombinatorial dissection of circuits and molecular targets (Ye)
Mon Oct 12, 2020	Stem cells/neurogenesis (Mandyam)
Wed Oct 14, 2020	Epigenetics (Miller)
Mon Oct 19, 2020	Alcohol (Koob)
Wed Oct 21, 2020	JC: Whole-brain imaging of addiction - alcohol focus (George)
Mon Oct 26, 2020	Nicotine/tobacco (Cruz/Roberto)
Wed Oct 28, 2020	Cannabinoids/synthetic drugs (Nguyen)
Mon Nov 2, 2020	JC: Cannabinoids/synthetic drugs (Nguyen)
Wed Nov 4, 2020	Pain and Anaesthetics (Hansen)
Mon Nov 9, 2020	JC: Pain and Anaesthetics (Hansen)
Wed Nov 11, 2020	Opioids (Contet)
Mon Nov 16, 2020	JC: Opioids (Martemyanov)
Wed Nov 18, 2020	Cocaine/Psychostimulants (Martemyanov)
Mon Nov 23, 2020	JC: Methamphetamine (Miller)
Wed Nov 25, 2020	Food (Zorrilla)
Thu Nov 26, 2020	Thanksgiving Holiday (No Class)
Fri Nov 27, 2020	Thanksgiving Holiday (No Class)
Mon Nov 30, 2020	Neurobiology of relapse / reinstatement (Martin-Fardon)
Wed Dec 2, 2020	JC: Relapse/reinstatement to alcohol (Matzeu)
Mon Dec 7, 2020	Medications development for alcohol use disorder (Mason)
Wed Dec 9, 2020	Course review (Zorrilla)