Physiological Psychology (PSYC 2200)

Syllabus: Salamanca Summer, 2016

Instructor

James J. Chrobak, PhD
Email: james.chrobak@uconn.edu
Office Hours: by appointment

Course Description: Course is an introduction to the basics of neuroanatomy, genetics, neuropharmacology, basic and systems neurophysiology as well as emergent function and dysfunction. While the focus is on basic neurobiology we will explore recent research on molecular genetics, neural microcircuits and the mechanism of drug action in relation to forebrain-based psychiatric/neurologic disorders (e.g., ADHD, schizophrenia, autism, basal ganglia disorders, Alzheimer's, Huntington's, Parkinson's and drug-abuse disorders).

Book: There is no textbook for this course: If you need reading material, there any number of good websites covering all the topics covered in this course. If you want to know "good" websites, ask!

Lectures/Book Readings: All of the quiz/test material will come from lectures/video clips/class presentations and postings on Husky CT.

We will also review (during lecture) some of the research studies detailed in a series manuscripts/reviews during the course (see research articles discussed in class link in Husky CT).

Course Objectives:

Section 1

1. Understand the different levels of analysis related to emergent brain functions: genetic, molecular, cellular, local circuit, brain areas and neural systems.

2. Learn major structural (~30+) and areal distinctions of the brain focusing on the neocortex and other forebrain structures (eg., hippocampus, thalamus, basal ganglia, hypothalamus; primary motor, premotor, prefrontal cortex, Wernicke's area, fusiform face area, ventral visual processing stream, limbic system).

3. Learn exemplar neuronal subtypes [based on morphology (eg,, pyramidal), location and axonal target (eg, thalamocortical), as well as neurotransmitter phenotype (eg, GABAergic)] and neuronal circuits (eg, neocortical microcircuits across sensory and associative processing areas, medial temporal lobe circuits, fronto-striatal-thalamic loops, neuromodulatory inputs to forebrain).

4. Learn the basic circuit level organization of the "canonical" cortex as well as the basic circuitry of the basal ganglia (cortico-striatopallidal-thalamocortical loops) and the entorhinal-hippocampal loop.

5. Learn the basic neuromodulatory inputs regulating forebrain function (eg, Reticular activating system, serotonergic input from dorsal raphe nucleus).

6. Understand the "flow" of sensory information across the primary and associative cortices, the dorsal and ventral visual streams and the medial temporal lobe as well as the organization of the frontal lobe with regards to connections to sensory cortices and cortico-striatopallidal-thalamic loops.

7. Learn about current technologies (e.g., fMRI, TMS, optogenetic techniques) used to probe/understand the relationship between brain mechanisms and emergent function at distinct hierarchical levels of analysis (e.g., drug action, systems neurophysiology, attention, memory, motor activity, decision-making, sleep).

Section 2

8. Learn very basics of electrophysiology and systems neurophysiology with a focus on sleep related phenomenon.

9. Understand the basics of neuropharmacology including receptor proteins, reuptake transporter proteins, drug-receptor interactions, specificity and non-specificity in drug action particularly with regards to stimulant drugs and dopamine, noradrenergic and serotonergic drugs.

10. Learn basics of genetic variation (eg, single nucleotide polymorphism, trinucleotide repeats, genome-wide association analyses) and how polymorphisms can determine and contribute to phenotypic variation in brain development, drug action and brain dysfunction as it relates to ADHD, foxp2 dyspraxia, Huntington's disease, fragile X syndrome and schizophrenia among other disorders.

11. Understand the symptoms and basic neural substrate of major neurologic/psychiatric disorders.

Section 3

12. Understand basics of the neurobiology of sleep and sleep related dysfunctions.

13. Understand the neural systems that support decision-making, memory and evaluation of emotional significance.

14. Understand the complex mechanisms that support learned behavior and memory processes as instantiated in synaptic plasticity and distributed neural circuits.

Course Requirements & Assessment:

Quizzes: (100 pts total) First there will be five 20pt quizzes, one per week administered via Husky CT on each Tuesday (5/17; 5/24; 5/31; 6/6; 6/13).

Exams: (100 pts total) Second there will be two cumulative exams, one "mid-term" on Wed June 1st, the "final" on Wed June 15. Each exam will be worth 50 points or the final may be worth 100 points, which ever earns you more points.

Project: (100 pts total) Lastly, you will be responsible for creating a powerpoint (minimally 6 slides) based on background from minimally two manuscripts (including one from list in "Research articles discussed in class"). You may either simply create the powerpoint or should you choose, present your powerpoint to the class. You may choose to work in a group of 2 or 3 on this "project". We will discuss in detail on the first day of the class and some class time will be devoted to working on and/or presenting the powerpoints.

Grading Details: Your job is to get 279 points

A = 279 points	A- = 270 points	
B+= 261 points	B = 249 points	B- = 240 points
C+= 231 points	C = 219 points	C- = 210 points
D+= 201 points	D = 189 points	D- = 180 points
F = < 180 points)		

Need More Details?

1) There will be minimally 5 on-line (Husky CT) quizzes (typically 10-12 questions each)

Each Quiz will be cumulative and cover the material covered in lectures. These are essentially study aids to test your developing knowledge of the material. You will be allowed to take quiz during class-time each Tuesday (20 questions = 20 points). If you don't score a 20 on that 1st attempt, you can take the quiz, two additional times on your own time prior to the start of Wednesday's class again. You will be awarded the highest score of the possible three attempts.

2) There will be two mid-term Exams, (each will have roughly 45-50 questions). Each question correct gets you 1 pt points, with one or more easy questions worth 2-5 pts.: Each Exam will include material from all prior quizzes and/or Exams (everything is cumulative). Each exam will be worth 50 points total and you can either have points from each

exam or the 2nd may be doubled, which ever earns you more points. Eg., 30 on 1st exam, 45 on 2nd, best to double 45 for 90 points. 42 on 1st exam, 40 on 2nd, best to add for 82 points.

3) The powerpoint presentation is designed to increase your knowledge of peer-reviewed research and following research threads in the literature as well as how to extract and present information to your colleagues. You can prepare your powerpoint (6 slide minimum) early in course and receive feedback to improve (final powerpoint will be graded). You may also choose to make a 5-20 minute presentation to the course at a time agreed to be Dr. Chrobak early in the course or during the final week. You may prepare and or present your powerpoint as a group (2-4 individuals, larger group, larger powerpoint or presentation). The goal here is your ability to extract and present, grading will be "generous" but not that generous. Everyone should make 90-100 points as long as they prepare in advance and respond to feedback.

Tentative Schedule (as of 1/22/2016); Note the schedule is pretty tentative, keep up with the posted pdfs and read ahead following the study guide. While quiz, exam dates will NOT change, content may vary depending upon class or instructors discretion!

1) (Monday May 16- Thursday May 19): Class Organization: Section 1
2) (Tue-May 17): Quiz #1: 3)
3) (Wed-May 18): Project/presentation discussion:
4) (Thur: May 19): Review material and begin Projects

5) (Mon May 23): Finish Section 1.
6) (Tue May 24): Quiz #2 largely on Section 1 material

Trip to Prague: No class

7) (Monday May 30-Thursday June 2): Section 2
8) (Tuesday May 31): Quiz #3 Action Potentials, RAS-sleep-wake, Neurotransmitters, Drugs and Receptors 1
9) (Wed June 1: Exam #1 largely on Section 1 material: Action Potentials, Neurotransmitters, Drugs and Receptors 2
10) (Thur June 2): Review exam material, review AP and drugs, work on Projects

11) (Mon June 6-Thursday June 9): Finish Section 2: Genetics and Genetic Disorders
12) (Tue June 7): Quiz #4: Review any material
13) (Wed-Thur June 8-9): Begin Section 3 (decision-making, memory, sleep).

14) (Mon June 13): Section 3
15) (Tues June 14): Quiz #4: Work on Projects or Presentations
16) (Wed-June 15): Review: Exam #2
16) (Thurs June 16): Research Presentations.