NEUR_BISC 408 Spring 2018 Systems Neuroscience: From Synapses to Perception

This lecture course is designed for upper-level undergraduate and early graduate students with an interest in Systems Neuroscience. The course will cover the sensory, motor, cognitive and behavioral state systems which together form the framework of the nervous system. The approach will consider basic concepts regarding the structural and functional organization of the brain: from the principles of neurotransmission, to microscopic arrangement of neural circuits, to integrative processes such as perception and learning. Readings will be drawn from a variety of source materials and will be posted to Blackboard prior to each lecture.

Instructors:

Sarah Bottjer (SWB)	HNB 218	bottjer@usc.edu
Bruce Yazejian (BY)	HNB B20	yazejian@usc.edu

Teaching Assistants:

Joshua Schiffman jsschiff@usc.edu
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The location of office hours will be in BioSpace (ZHS 360A)

Lecture Times & Location: Mon & Wed 2:00-3:20 pm in SOS B2

Office Hours for SWB, BY: Anytime by appointment, arranged via e-mail

Discussion times & Location
There are 4 discussion sections; see Schedule of Classes at http://classes.usc.edu/term-20181/classes/bisc/

Course materials (including PowerPoint slides), reading assignments and handouts will be posted on Blackboard (http://blackboard.usc.edu/) as they become available. Please check this site frequently for course information. We also encourage the use of online discussions among students via Blackboard.

Assignments and Grading*

10 quizzes @ 10 pts each	100	(12 quizzes; lowest 2 are dropped)
3 mid-term exams @ 100 pts each	300	
1 final exam (cumulative)	150	(100 points for midterm 4 plus 50 points based on all material)
Total	**550**	

*The instructors may, at their discretion, weight the final grades according to class participation. You can therefore increase the probability of getting a higher grade by being proactive in terms of asking (relevant) questions in class and/or contributing to discussions.

Learning objectives: An important goal of this course is to encourage critical evaluation and independent thinking about scientific evidence and the conclusions one can draw from it. We want you to develop your skills of objective analysis not only as they apply to the function of the nervous system, but also in general. A further goal is to encourage conceptual thinking that brings together many diverse elements from small details (the parts of the nervous system) to the big picture (the integrated nervous system as a function of the relations and integration of its component parts). These are skills that will serve you well in the future – not just during the time you are taking this course.

Exams: There will be four exams (3 mid-terms and 1 final as outlined above). There are no make-up exams. If exceptional circumstances prevent you from attending an exam, your reason for missing it must be accompanied by a written statement from a third party (e.g. a note from a medical doctor with contact information). Exams will be mixed format, including short-answer, fill-ins, etc.

Grading exams: Exams will be graded within the week after completion. You may request re-evaluation of the grade during the 7 days after the exam is returned. To do so, provide a typewritten explanation of your argument for a higher grade (explain clearly why you think your answer deserves more credit). Unless the instructor has made a mistake in tallying the grade, requests for additional credit are rarely successful.

Schedule may be updated as the semester progresses. Please note: readings will be posted on Blackboard as PDF files or links. Check assigned readings on Blackboard for each lecture.

DATE	SUBJECT / LECTURER
Jan 8 MON (Lecture 1)	Introduction: expectations and goals of this class (BY & SWB)
Jan 10 WED (Lecture 2)	Overview of synaptic transmission (BY)
Jan 15 MON (NO CLASS)	NO CLASS: Martin Luther King Day
Jan 17 WED (Lecture 3)	Electrical properties of neurons, cable theory (BY)
Jan 22 MON (Lecture 4)	Driving forces, reversal potentials (BY)
Jan 24 WED (Lecture 5)	Neuromuscular junction: synaptic action, equivalent circuit (BY)
Jan 29 MON (Lecture 6)	Spinal reflexes, synaptic circuit analysis, alpha and gamma motor neurons (BY)
Jan 31 WED (Lecture 7)	Neural coding and neural networks (BY)
Feb 5 MON (Lecture 8)	Central pattern generators: lobster stomatogastric ganglion, other invertebrate preps (BY)
Feb 7 WED (EXAM 1)	**MIDTERM EXAM 1**
Feb 12 MON (Lecture 9)	Motor Systems I: Cerebral Cortex (SWB)
Feb 14 WED (Lecture 10)	Motor Systems II: Basal ganglia (SWB)
Feb 19 MON (NO CLASS)	NO CLASS: President's Day
Feb 21 WED (Lecture 11)	Motor Systems III: Cerebellum (SWB)
Feb 26 MON (Lecture 12)	BMIs: Brain-Machine Interfaces (SWB)
Feb 28 WED (Lecture 13)	Addiction (SWB)
Mar 5 MON (Lecture 14)	Vocal learning in songbirds (SWB)

Mar 7 WED (EXAM 2)	**MIDTERM EXAM 2**
Mar 12 MON	**Spring Break**
Mar 14 WED	
Mar 19 MON (Lecture 15)	Auditory System: Auditory Cortex I (SWB)
Mar 21 WED (Lecture 16)	Auditory System: Auditory Cortex II – Bats & Biosonar (SWB)
Mar 26 MON (Lecture 17)	Auditory Cognition & Perception: Speech & Language (SWB)
Mar 28 WED (Lecture 18)	Auditory System: Sound Localization (SWB)
Apr 2 MON (Lecture 19)	Vision 1: Visual Cortex (SWB)
Apr 4 WED (Lecture 20)	Vision 2: Object Perception (SWB)
Apr 9 MON (EXAM 3)	**MIDTERM EXAM 3**
Apr 11 WED (Lecture 21)	Learning and Memory, invertebrate models (*Aplysia,* etc.) (BY)
Apr 16 MON (Lecture 22)	Synaptic changes underlying LTP & LTD I (BY)
Apr 18 WED (Lecture 23)	Synaptic changes underlying LTP & LTD II (BY)
Apr 23 MON (Lecture 24)	Cognition: Spatial Cognition in the Hippocampus (BY)
Apr 25 WEDS (Lecture 25)	Hypothalamus and Behavior (BY)
May 7 MON, 2-4 pm	**FINAL EXAM**

Statement for Students with Disabilities: Students requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to one of the instructors as early in the semester as possible. DSP is located in STU 301 and is open 8:30 a.m.–5:00 p.m., Monday through Friday.
DSP Phone (213) 740-0776; DSP TTD (only) phone (213) 740-6948; DSP Fax (213) 740-8216
DSP Email: ability@usc.edu; DSP website: http://sait.usc.edu/academicsupport/centerprograms/dsp/home_index.html

Statement on Academic Integrity (from University Student Conduct Code section 11.00): *General principles of academic integrity include and incorporate the concept of respect for the intellectual property of others, the expectation that individual work will be submitted unless otherwise allowed by an instructor, and the obligations both to protect one's own academic work from misuse by others as well as to avoid using another's work as one's own. All students are expected to understand and abide by these principles. Faculty members may include additional classroom and assignment policies, as articulated on their syllabus.*

For further information regarding appropriate student conduct, and the consequences of inappropriate conduct, students should refer to the Student Guidebook "SCAMPUS" http://scampus.usc.edu/. In particular the University Student Conduct code **section 10** (http://scampus.usc.edu/university-student-conduct-code/), **section 11** (http://scampus.usc.edu/1100-behavior-violating-university-standards-and-appropriate-sanctions/), and **section 12** (http://scampus.usc.edu/1200-conduct-review-system/).