

# Syllabus

## Systems Neuroscience

### NRSC 560, Spring 2019

---

**Course listing:** NRSC 560

**Semester offered:** Spring

**Number of units:** 4

**Course content:**

This course will provide a comprehensive overview of neural systems, including those associated with sensory, motor, autonomic, and cognitive processes. Relevant aspects of neuroanatomy will be presented and diseases affecting different systems will be discussed.

**Prerequisites:**

NRSC 588 or permission of course coordinator.

**Location and Time:**

Medical Research Building, Room 401; Tuesday & Thursday 10:00 - 11:50 a.m.

**Optional Tutorial Session:**

To-be announced

**Course Coordinator:**

Andrew Fuglevand (Physiology), Life Sciences North 356, 621-6983, [fuglevan@email.arizona.edu](mailto:fuglevan@email.arizona.edu)

**Additional Instructors:**

Shaowen Bao (Physiology), AHSC 4122, [sbao@email.arizona.edu](mailto:sbao@email.arizona.edu)

Haijiang Cai (Neuroscience), Gould-Simpson 427, 621-6654, [haijiangcai@email.arizona.edu](mailto:haijiangcai@email.arizona.edu)

Stephen Cowen (Psychology), Life Sciences North 312, 626-2612 [scowen@email.arizona.edu](mailto:scowen@email.arizona.edu)

Erika Eggers (Physiology/Biomedical Engin) AHSC 4111, 626-7137, [eeegggers@email.arizona.edu](mailto:eeegggers@email.arizona.edu)

Ralph Fregosi (Physiology) AHSC 4224, 621-2203, [fregosi@email.arizona.edu](mailto:fregosi@email.arizona.edu)

Katalin Gothard (Physiology), Life Science North 350, 626-1448, [gothard94@gmail.com](mailto:gothard94@gmail.com)

Robert Wilson (Psychology), Psychology 416, 626-8597, [bobcwilson@gmail.com](mailto:bobcwilson@gmail.com)

**Office hours:**

"Electronic Open-Door" policy. Contact us by email, and we will try to answer as soon as possible.

**Textbook:**

Kandel, Schwartz, Jessel, Siegelbaum & Hudspeth, *Principles of Neural Science* 5th Edition, 2012

**Organization of lectures:**

Each session usually begins with a discussion of selected research publications associated with the previous lecture session. This is followed by a 60-minute lecture. Lectures and associated readings will be posted on the course website in advance.

**Organization of Discussions:**

- For each paper assigned, every student will prepare (in advance of the discussion) a one-page type written bulleted list with three subheadings, *Strengths*, *Weaknesses*, *Questions*. These lists should provide the framework for the discussions. These lists will be turned in electronically prior to each session for grading.
- For each assigned reading, one student will be designated to lead the discussion. This involves providing an overview of the context, purpose, and main findings of the study. Presentation and discussion of the main strengths and weaknesses of the paper will follow this.

- Active participation in the discussion is required for all students.

### **Exams and Assignments:**

Students must take 3 exams (each worth 100 points) and complete discussion assignments.

### **Grades:**

Regular grades are awarded for this course: A B C D E.

The final course grade is determined as follows:

- 1) Written exams: 75% of final grade
- 2) Discussion and Discussion assignments: 25% of final grade

Schedule – Spring Semester, 2019:

**Lectures & Exams** indicated in **bold**

DATE	TIME	TOPIC
Thur Jan 10	10:00 – 11:50	<b>Canonical structure of the mammalian brain</b> (Gothard)
Tue Jan 15	10:00 – 11:50	<b>Somatosensation – sensory detection</b> (Fuglevand)
Thur Jan 17	10:00 – 10:50 10:50 - 11:50	Discussion - Sensory detection (Fuglevand) <b>Somatosensation - spinal processing</b> (Fuglevand)
Tues Jan 22	10:00 – 10:50 10:50 - 11:50	Discussion - Spinal processing (Fuglevand) <b>Somatosensation – supra-spinal processing</b> (Fuglevand)
Thur Jan 24	10:00 – 10:50 10:50 - 11:50	Discussion - supra-spinal processing (Fuglevand) <b>Chemical senses - olfaction</b> (Cai)
Tue Jan 29	10:00 – 10:50 10:50 - 11:50	Discussion - olfaction (Cai) <b>Chemical senses - taste</b> (Cai)
Thur Jan 31	10:00 – 10:50 10:50 - 11:50	Discussion - taste (Cai) <b>Vision - retina</b> (Eggers)
Tue Feb 5	10:00 – 10:50 10:50 - 11:50	Discussion - retina (Eggers) <b>Vision - LGN and VI</b> (Eggers)
Thur Feb 7	10:00 – 10:50 10:50 - 11:50	Discussion - LGN and VI (Eggers) <b>Vision - extrastriate cortex</b> (Eggers)
Tue Feb 12	10:00 – 10:50 10:50 - 11:50	Discussion - extrastriate cortex (Eggers) <b>Auditory system - cochlea</b> (Bao)
Thur Feb 14	10:00 - 11:50	<b>EXAM 1 (Somatosensory, Chemical Senses, Vision)</b>
Tue Feb 19	10:00 – 10:50 10:50 - 11:50	Discussion - cochlea (Bao) <b>Auditory system - brainstem &amp; cortical processing</b> (Bao)
Thur Feb 21	10:00 – 10:50 10:50 - 11:50	Discussion - brainstem & cortical processing (Bao) <b>Motor systems – motor units</b> (Fuglevand)
Tue Feb 26	10:00 – 10:50 10:50 - 11:50	Discussion – motor units (Fuglevand) <b>Motor systems - spinal circuitry</b> (Fuglevand)
Thur Feb 28	10:00 – 10:50 10:50 - 11:50	Discussion - spinal circuitry (Fuglevand) <b>Motor systems - motor cortex</b> (Fuglevand)
Mar 4 - 8		<b>Spring Break</b>
Tue Mar 12	10:00 – 10:50 10:50 - 11:50	Discussion - motor cortex (Fuglevand) <b>Motor systems - cerebellum</b> (Fuglevand)
Thur Mar 14	10:00 – 10:50 10:50 - 11:50	Discussion - cerebellum (Fuglevand) <b>Motor systems - basal ganglia</b> (Fuglevand)
Tue Mar 19	10:00 – 10:50 10:50 - 11:50	Discussion - basal ganglia (Fuglevand) <b>Autonomic nervous system – breathing control</b> (Fregosi)
Thur Mar 21	10:00 – 10:50 10:50 - 11:50	Discussion - breathing control (Fregosi) <b>Autonomic nervous system - cardiovascular control</b> (Fregosi)
Tue Mar 26	10:00 – 10:50 10:50 - 11:50	Discussion – cardiovascular control (Fregosi)

Thur Mar 28	10:00 – 10:50 10:50 - 11:50	<b>EXAM 2 (Auditory System, Motor Systems, Autonomic Nervous System)</b>
Tue Apr 2	10:00 – 11:50	<b>Learning/Memory - forms of memory</b> (Cowen)
Thur Apr 4	10:00 – 10:50 10:50 - 11:50	Discussion – forms of memory (Cowen) <b>Learning/Memory - hippocampus</b> (Cowen)
Tue Apr 9	10:00 – 10:50 10:50 - 11:50	Discussion - hippocampus (Cowen) <b>Learning/Memory - neocortex</b> (Cowen)
Thur Apr 11	10:00 – 10:50 10:50 - 11:50	Discussion - neocortex (Cowen) <b>Emotion/Arousal - amygdala &amp; emotion</b> (Gothard)
Tue Apr 16	10:00 – 10:50 10:50 - 11:50	Discussion – amygdala & emotion <b>Emotion/Arousal - ascending autonomics</b> (Gothard)
Thur Apr 18	10:00 – 10:50 10:50 - 11:50	Discussion – Ascending autonomics (Gothard) <b>Emotion/Arousal – social neuroscience</b> (Gothard)
Tue Apr 23	10:00 – 11:50	Discussion – social neuroscience (Gothard) <b>Higher cognitive functions – reinforcement learning</b> (Wilson)
Thur Apr 25	10:00 – 10:50 10:50 - 11:50	Discussion – reinforcement learning (Wilson) <b>Higher cognitive functions – decision making</b> (Wilson)
Tue Apr 30	10:00 – 10:50 10:50 - 11:50	Discussion – decision making (Wilson) <b>Computational modeling</b> (Wilson)
Tue May 7	10:00 - 11:50	<b>Exam 3 (Learning/Memory, Emotion, Higher Cognitive)</b>

**Attendance Policy**

Attendance records will not be collected but regular attendance of lectures is considered essential for satisfactory understanding of the material.

All holidays or special events observed by organized religions will be honored for those students who show affiliation with that particular religion. Absences pre-approved by the UA Dean of Students (or Dean designee) will be honored. Make up exams will only be allowed in cases of well-documented emergencies, with approval of instructors. Make up exams will be modified from the original and given as close to the exam date as possible.

**Classroom Behavior and Classroom Policies Regarding Effective Learning:**

Students are expected to adhere to the Code of Academic Integrity. The policies related to such issues as cheating and plagiarism will be strictly enforced. Read the full Code at:

<http://deanofstudents.arizona.edu/codeofacademicintegrity>

In addition, individuals in groups can learn best when all are considerate of each other. Therefore, we ask that you please make every effort to make the environment in the classroom conducive to effective learning. This includes such things as turning off your cell phone, only using your laptop for class related activities, refraining from conversation that is not geared toward the topic of the day, arriving on time, and leaving when class is finished. Read the full Student Code of Conduct at:

<http://deanofstudents.arizona.edu/policiesandcodes/studentcodeofconduct>

**Students with Disabilities**

If you anticipate barriers related to the format or requirements of this course, please meet with Dr. Fuglevand so that we can discuss ways to ensure your full participation in the course. If you determine that disability-related accommodations are necessary, please register with Disability Resources (621-3268; [drc.arizona.edu](http://drc.arizona.edu)) and notify Dr. Fuglevand of your eligibility for reasonable accommodations. We can then plan how best to coordinate your accommodations.

**Student Code of Academic Integrity**

Students are encouraged to share intellectual views and discuss freely the principles and applications of course materials. However, graded work/exercises must be the product of independent effort unless otherwise instructed. Students are expected to adhere to the UA Code of Academic Integrity. See:

<http://deanofstudents.arizona.edu/tipsforavoidingacademicdishonesty>

**Confidentiality of Student Records**

<http://www.registrar.arizona.edu/ferpa/default.htm>

**Subject to Change Statement**

Information contained in the course syllabus, other than the grade and absence policy, may be subject to change with advance notice, as deemed appropriate by the instructor. Any changes to the syllabus will be announced in class and posted on the D2L website.