Overview

Course: Biological Psychology, U09-Psychology 3401

Semester: FALL 2013

Description: Beginning with nerve cells and progressing through the development, structure, and function of the nervous system, this course provides an overview of sensory and motor activity and of the higher processes of learning, memory and language. Brain injury resulting from stroke or trauma and diseases like Alzheimer's, schizophrenia and autism are covered, along with findings illuminating their causes and treatments. We use text, lectures, animations, discussion, and readings in contemporary research.

Short outside readings will be assigned for each class.

Prerequisite: Psychology 100

Instructor: David Crowley, dcrowley@artsci.wustl.edu (314) 378-5173


Online text resources: http://www.mindsmachine.com/

Weekly Course Schedule:

1. Introduction & Cells and Structures (Ch 1 & 2) – August 29
2. Neurophysiology: (Ch3) – September 5
3. Chemistry of Behavior (Ch 4) – September 12
4. Exam 1 & The Sensorimotor System (Ch 5) – September 19
5. Hearing, Balance, Taste and Smell (Ch 6) – September 26
6. Vision (Ch 7)– October 3
7. Hormones and Sex (Ch 8) (Paper proposal due) – October 10
8. Exam 2 & Homeostasis (Ch 9) – October 17
9. Biological Rhythms and Sleep (Ch 10) – October 24
10. Emotions, Aggression and Stress (Ch 11) (Paper draft due) – October 31
11. Psychopathology (Ch 12) – November 7
12. Exam 3 Memory, Learning and Development (Ch 13) – November 14
13. Attention and Consciousness (Ch 14) – November 21
   Thanksgiving – November 28
14. Language and our Divided Brain (Ch 15) (Paper due) – December 5
15. Exam 4 - December 12
Grading Criteria:

<table>
<thead>
<tr>
<th>Type</th>
<th>Percentage of Grade</th>
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<tbody>
<tr>
<td>4 Exams</td>
<td>60</td>
</tr>
<tr>
<td>1 Term Paper</td>
<td>15</td>
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<tr>
<td>15 Online Quizzes</td>
<td>20</td>
</tr>
<tr>
<td>Attendance and Participation</td>
<td>5</td>
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<tr>
<td>Total</td>
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Learning Objectives

1. Become familiar with the history of neural and psychological science.
2. Learn the basic anatomy and physiology of the nervous system as it relates to cognitive processing and behavioral control.
3. Understand the methods of research used to support neural and psychological science.
4. Acquire the ability to think critically about the application of research findings to an understanding of the physiological basis of behavior and cognition.

Grading & Requirements

Grading

As shown on the overview, the course has been divided into four units, each consisting of 3-4 text chapters. There will be one exam per unit. In addition, there will be one term paper and weekly online quizzes to be completed before class.

1. Each exam will contribute 15% toward the final grade.
2. Weekly online quizzes will comprise 20% of the final grade and will cover conceptual material for the upcoming class.
3. The term paper will count 15% of the final grade.
4. Class attendance and participation will count 5%. An absence is excused when a student e-mails the instructor at least a day before the class day or telephones the instructor on the class day. E-mailed excuses will not be accepted on or after the day of the class.
5. No extra credit assignments will be available except through the ACTRAC option.
6. ACTRAC projects count 20% of the final grade.
7. No make-up exams are possible for students who are dissatisfied with their exam scores.
8. A grade of incomplete will not be given, unless supported by timely documentation. When such circumstances occur prior to the deadline for dropping a course, students are encouraged to drop the course rather than requesting an incomplete.
9. Term papers received after the final exam will be given a grade of zero.

Term Papers

1. Term papers may cover any topic related to biological psychology and may not exceed 2500 words.
2. ACTRAC students should cover their topic in greater depth and may use 3500 words.
3. Every assertion in the paper must be backed up with a reference to an original journal article, to an interview you conducted or to personal experience.
4. References should be cited in accordance with American Psychological Association style as illustrated in sample papers supplied by the instructor.
5. All sentences should be clear and conform to standard rules of grammar and punctuation. The written proposal and draft will help you to focus and clarify your writing.

### Grade Conversion

<table>
<thead>
<tr>
<th>Minimum Cutoff</th>
<th>Letter Grade</th>
<th>Minimum Cutoff</th>
<th>Letter Grade</th>
</tr>
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<tbody>
<tr>
<td>97.00</td>
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<td>73.00</td>
<td>C</td>
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<td>93.00</td>
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<td>F</td>
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<tr>
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<td>C+</td>
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### Late and Missed Exams

1. Students are expected to take all exams during class on the announced exam dates. Course history has shown that students who miss an exam usually do not perform well on the make-up exam and might also fall behind, which affects performance on subsequent exams.

2. All exams must be taken during class on the date indicated on the course calendar, unless highly extenuating circumstances exist and are documented in writing. Students who have emergencies that prevent them from attending exams must inform the instructor as soon as the emergency arises.

3. If a student misses an exam and cannot provide documentation, the exam can be taken late, but a 10% late penalty will be assessed. A missed final exam unsupported by prior notice or adequate documentation will be given a grade of zero.

4. All late exams, excused or unexcused, are administered in the University College offices by appointment for a $5.00 fee, and require authorization by the instructor. To schedule a make-up appointment, please contact University College at 314-935-6700.

5. Students who miss more than one exam are urged to drop the course.

### Accommodations and Assistance

For general academic assistance, consult your academic adviser and take advantage of Cornerstone's wide variety of student resources: [http://cornerstone.wustl.edu](http://cornerstone.wustl.edu) (314-935-5970). If you require special accommodations for lecture or for taking exams please contact the Disability Resources Coordinator at Cornerstone.

### Academic Integrity

Students are expected to comply with the University’s policy on academic integrity. If you are uncertain about what constitutes a violation of the policy, ask the instructor, or access the policy at: [http://www.wustl.edu/policies/undergraduate-academic-integrity.html](http://www.wustl.edu/policies/undergraduate-academic-integrity.html)

### Course Evaluation

You should plan on participating in the course evaluation at the end of the semester and may do so be visiting: [http://evals.wustl.edu](http://evals.wustl.edu)
Session 1: Course Overview, Introduction, Cells and Structures: Thursday, August 29: 6:00 - 8:30 PM.
Assignment due at class time: Read Chapters 1 & 2 and complete Chapter 1 and 2 quizzes online.
Topics:

1. Course introduction.
3. Careful research design in neural science.
4. Cells of the nervous system.
5. The nervous system throughout the body.
7. Support systems in the brain.
8. Brain imaging techniques

Session 2: Neurophysiology: Thursday, September 5: 6:00 - 8:30 PM.
Assignment due at class time: Read Chapter 3 and complete Chapter 3 quiz online.
Topics:

1. Electrical signals in the nervous system.
2. Action potentials.
3. Synaptic potentials.

Session 3: The Chemistry of Behavior: Thursday, September 12: 6:00 - 8:30 PM
Assignment due at class time: Read Chapters 4 and complete Chapter 4 quiz online.
Topics:

1. Chemical signals at synapses.
2. Neurotransmitter systems.
3. Drugs like keys in a lock.
4. Drugs in functional classes.
5. Drug abuse is pervasive

Session 4: Exam 1 + the Sensory Motor System: Thursday, September 19: 6:00 - 8:30 PM
Assignment due at class time: Prepare for Exam 1, Read Chapters 5 and complete Chapter 5 quiz online.
Topics:

1. The somatosensory system
   a. Receptor cells
   b. Selective and analytic processing
   c. Successive levels of sensory processing
2. Pain
   a. Dimensions of pain
   b. Discrete pain pathway
   c. Difficulties of pain control
3. Movement and the motor system
   a. Precise programming and monitoring
   b. Complex neural control of muscles

Session 5: Hearing, Balance, Taste and Smell: Thursday, September 26: 6:00 - 8:30 PM
Assignment due at class time: Read Chapters 6 and complete Chapter 6 quiz online.
Topics:
1. Hearing and Balance
   a. Parts of the ear and their function
   b. Auditory pathways
   c. The basis of pitch
   d. Localization of sound
   e. Cortical perception of sound
   f. The problem of deafness
   g. The inner ear and balance
   h. Motion sickness
2. Chemical senses
   a. The basis of taste
   b. Sensations of odor

**Session 6: Vision – from Eye to Brain: Thursday, October 3: 6:00 - 8:30 PM**

**Assignment due at class time:** Read Chapters 7 and complete Chapter 7 quiz online.

**Topics:**

1. Extent of the visual system
2. Color vision
3. Visual areas of the cortex
4. Dual streams in the visual system
5. Visual deficiencies and neural science

**Session 7: Hormones and Sex: Thursday, October 10: 6:00 - 8:30 PM**

**Assignment due at class time:** Read Chapters 8 and complete Chapter 8 quiz online. *Term paper proposals due!*

**Topics:**

1. The endocrine system
   a. Hormones throughout the body
   b. Hormones at the cellular level
   c. Specific endocrine glands
2. Reproduction
   a. Four stages of reproductive behavior
   b. The neural circuitry behind reproductive behavior
   c. The diversity of sexual behavior
3. Sexual differentiation and orientation
   a. Genetic and hormonal regulation of male and female development
   b. Fetal hormones and adult masculinity

**Session 8: Exam 2 + Homeostasis: Thursday, October 17: 6:00 - 8:30 PM**

**Assignment due at class time:** Prepare for Exam 2. Read Chapter 9 and complete Chapter 9 quiz online.

**Topics:**

1. Principle of homeostasis
   a. Features of homeostatic systems
2. Fluid regulation
   a. Fluids and compartments
   b. Two triggers for thirst
   c. Water balance and salt
3. Food and energy regulation
   a. Nutrients and future energy needs
   b. The role of insulin
   c. The hypothalamus and hunger
   d. The treatment of obesity
e. Life-threatening eating disorders

Session 9: Biological Rhythms and Sleep: Thursday, October 24: 6:00 - 8:30 PM

Assignment due at class time: Read Chapter 10 and complete Chapter 10 quiz online.

Topics:

1. Biological rhythms
   a. Daily activity rhythms
   b. Circadian clock in the hypothalamus
2. Sleeping and waking
   a. Human sleep stages
   b. Life span sleep changes
   c. Sleep manipulations
   d. Biological functions of sleep
   e. The four interactive neural systems that control sleep
   f. Sleep disorders

Session 10: Emotions, Aggression and Stress: Thursday, October 31: 6:00 - 8:30 PM

Assignment due at class time: Read Chapter 11 and complete Chapter 11 quiz online. Paper drafts due!

Topics:

1. Emotional processing
   a. Theories of emotion
   b. Facial expressions and core emotions
   c. Brain circuits in emotion?
2. Aggression and stress
   a. Neural circuits, hormones & synaptic transmitters in violence and aggression
   b. Bodily responses to stress

Session 11: Psychopathology: Thursday, November 7: 6:00 - 8:30 PM

Assignment due at class time: Read Chapter 12 and complete chapter 12 quiz online.

Topics:

1. The toll of psychiatric disorders
2. Mood disorders
3. Anxiety disorders

Session 12: Exam 3 + Memory, Learning and Development: Thursday, November 14: 6:00 - 8:30 PM

Assignment due at class time: Prepare for Exam 3. Read Chapter 13 and complete chapter 13 quiz online.

Topics:

1. Types of learning and memory
   a. Several kinds of learning and memory
   b. Non-declarative memory and brain regions
   c. Capture, storage and retrieval on information in the brain
2. Neural mechanisms of memory
   a. Neuronal remodeling in memory storage
   b. Synaptic plasticity in hippocampal circuits
3. Development of the brain
   a. Orderly growth and development of the brain
   b. Six distinct stages of the development
   c. The interaction of genes and experience
   d. Life-span changes in the brain
Session 13: Attention and consciousness: Thursday, November 21: 6:00 - 8:30 PM
Assignment due at class time: Read Chapter 14. Complete chapter 14 quiz online.
Topics:

1. Attention: the focus of cognitive processes on specific objects
2. Attention: endogenous and exogenous?
3. Electrical correlates of attention in the brain
4. Multiple brain regions in attention
5. The linkage of consciousness and attention

Session 14: Language in the brain: Thursday, December 5: 6:00 - 8:30 PM
Assignment due at class time: Read Chapter 15 and complete Chapter 15 quiz online. Final paper due!
Topics:

1. Speech and language
   a. Language: innate and learned
   b. Language disorders and brain injuries
   c. Impairment of reading skills
   d. Language and brain mapping
2. Cerebral asymmetry
   a. Differences between the left and right hemispheres
   b. Deficits in spatial perception following right hemisphere damage
3. Recovery of function
   a. Stabilization and reorganization in the brain
   b. Rehabilitation and retraining in recovery from brain and spinal cord injury

Session 15 Exam 4: Thursday, December 12: 6:00 - 8:30 PM
Assignment due at class time: Prepare for Exam 4