Course Goals: This is an advanced undergraduate course in cognitive and behavioral neuroscience. It has as a prerequisite PSY B320 (Behavioral Neuroscience), and is designed primarily for psychology and neuroscience majors and others with a strong interest in behavioral neuroscience. This course will guide learning about the biological basis of behavior, experience, and mental processes, with an emphasis on current knowledge of brain function related to cognitive, emotional, and social behavior. It will introduce you to research emerging from multiple levels of analysis (molecular, cellular, neural systems, behavioral and cognitive). The course will have a neuroscience and neuropsychology orientation (neurobiology, neural systems, neuropsychology, clinical neuroscience and neuroplasticity). The topical content can vary from year to year, but typically is drawn from areas of learning, memory, goal-directed behavior, response to stress, decision making, and socio-emotional behavior, along with consideration of disorders of brain function (neurodegenerative disease, developmental disorders, addiction, brain damage, and mental illness). Students will gain understanding of the methods, experimental approaches, and the current knowledge of the neural systems underlying behavior and cognition, including cellular, molecular and developmental aspects.

The neurosciences are perhaps the fastest growing areas in all of science. Neuroscience is not a single discipline, but is fundamentally an interdisciplinary endeavor that requires the student to become familiar with and conversant in the methods, tools, and language of multiple disciplines, including biomolecular sciences, genetics, neuroanatomy, neurophysiology, neuropharmacology, and behavioral and cognitive science. Over the last two decades, the application of revolutionary new tools and methods at both ends of the disciplinary spectrum—molecular biology, gene targeting, functional genomics, and patch-clamp analysis of ion channel functioning at one end, functional imaging and computational modeling at the other—have combined to produce explosive increases in knowledge of how brain function controls and produces behavior and mental experience. Along with the neuroimaging revolution, the refinement of tools to manipulate or monitor functions of brain cells and circuits in carefully defined studies in behaving animals have helped bridge the gap between molecular and behavioral processes, and understanding gained through experimental animal studies are an important component of this class.

One by-product of this accelerating growth is the maddeningly difficult task of trying to assimilate and integrate this continuing expansion of knowledge into a coherent and manageable 15-week course. A second by-product is that five years from now, the content of any neuroscience will likely be very different. The best educational goal is to learn how to learn about the brain sciences. It is not enough to learn what is currently viewed as the state of knowledge about brain mechanisms of behavior, but how that knowledge has emerged from the way research questions have been asked and how methods, technology, and model systems have been devised to address those questions.

Learning Objectives

- To learn how the brain functions at the molecular, cellular, and systems level to control normal behavior, cognition and experience, and important methods that have revealed those functional principles.
- To learn the properties and functional systems that mediate cognitive, emotional, and social functions and capabilities of human and non-human animals.
- To learn how the cellular and systems properties of brain determine experience, behavior and mental activity of individuals, and how experience and development modify brain structure and function.
- To learn the experimental methods and approaches to understanding the brain.
- To gain broad understanding experimental research directed toward understanding normal and abnormal brain function and behavior, including applications to human brain disorders.
<table>
<thead>
<tr>
<th>Class</th>
<th>Date</th>
<th>Day</th>
<th>Topic</th>
<th>Book Reading</th>
<th>Article Reading</th>
<th>Major Assignments</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>1/7</td>
<td>M</td>
<td>Orientation and Class Organization</td>
<td>K1-3</td>
<td></td>
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<td>2</td>
<td>1/9</td>
<td>W</td>
<td>A Brief Tour of the Brain; Touchpoints of Neuroscience</td>
<td>R1; K4-7</td>
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<td>1/14</td>
<td>M</td>
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<td>K4-7</td>
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<tr>
<td>3</td>
<td>1/16</td>
<td>W</td>
<td>Phantom Limbs; Neuroscience in the News 1 (Model)</td>
<td>R2</td>
<td>1, 2</td>
<td>Paper Topic</td>
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<td>M</td>
<td>No class-Dr. Martin L. King Holiday</td>
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<tr>
<td>5</td>
<td>1/23</td>
<td>W</td>
<td>Seeing and Knowing</td>
<td>R2</td>
<td></td>
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<tr>
<td>6</td>
<td>1/28</td>
<td>M</td>
<td>Synesthesia- Windows to Perception</td>
<td>R3; Cy1-2</td>
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<tr>
<td>7</td>
<td>1/30</td>
<td>W</td>
<td>Synesthesia- Windows to Perception</td>
<td>Cy3-7</td>
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<td>8</td>
<td>2/4</td>
<td>M</td>
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<tr>
<td>9</td>
<td>2/6</td>
<td>W</td>
<td>Synesthesia- Windows to Perception; EXAM 1</td>
<td>Cy8-9</td>
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<td>Exam 1 open</td>
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<tr>
<td>10</td>
<td>2/11</td>
<td>M</td>
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<td>Exam 1 close</td>
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<td>11</td>
<td>2/13</td>
<td>W</td>
<td>Memory Systems</td>
<td>K8-10</td>
<td>2,3,4</td>
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<tr>
<td>12</td>
<td>2/18</td>
<td>M</td>
<td>Memory Systems</td>
<td></td>
<td>5,6,7</td>
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<td>2/20</td>
<td>W</td>
<td>Molecular Mechanisms of Learning &amp; Memory</td>
<td>K11-16</td>
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<td>2/25</td>
<td>M</td>
<td>Molecular Mechanisms of Learning &amp; Memory</td>
<td>K17-24</td>
<td>8</td>
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<td>2/27</td>
<td>W</td>
<td>Adult Neurogenesis</td>
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<td>9,10,11</td>
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<td>16</td>
<td>3/04</td>
<td>M</td>
<td>Adult Neurogenesis</td>
<td>K24-26</td>
<td>12,13</td>
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<tr>
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<td>3/06</td>
<td>W</td>
<td>EXAM 2 (in class)</td>
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<td>M; W</td>
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<td>20</td>
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<td>Historical Perspectives on Psychosurgery</td>
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<td>14, 15, 16, 17</td>
<td>Review “My Lobotomy”</td>
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<td>My Lobotomy Discussion</td>
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<td>22</td>
<td>3/27</td>
<td>W</td>
<td>Mirror Neurons &amp; Autism</td>
<td>R4</td>
<td>18, 19</td>
<td></td>
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<td>23</td>
<td>4/1</td>
<td>M</td>
<td>Mirror Neurons continued</td>
<td>R5</td>
<td>20</td>
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<td>4/3</td>
<td>W</td>
<td>Language and its Evolution</td>
<td>R6</td>
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<tr>
<td>25</td>
<td>4/8</td>
<td>M</td>
<td>Aesthetics, Introspection and Self</td>
<td>R7-9</td>
<td></td>
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<tr>
<td>26</td>
<td>4/10</td>
<td>W</td>
<td>Reward, Risk &amp; Decision Making</td>
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<td>21, 22,23</td>
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<td>27</td>
<td>4/15</td>
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<td>Reward, Risk &amp; Decision Making</td>
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<td>28</td>
<td>4/17</td>
<td>W</td>
<td>Neuroscience in the News (remaining presentations)</td>
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<td>29</td>
<td>4/22</td>
<td>M</td>
<td>Pain</td>
<td>G1-4</td>
<td></td>
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<td>30</td>
<td>4/24</td>
<td>W</td>
<td>Pain</td>
<td>G5-8</td>
<td></td>
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</tr>
<tr>
<td>31</td>
<td>4/29</td>
<td>M</td>
<td>Pain-Social aspects</td>
<td></td>
<td>24, 25, 26</td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>4/30</td>
<td>M</td>
<td>Final Exam</td>
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</tr>
</tbody>
</table>

Office Hours: M; W 3:30 – 4:15 PM or by appointment: LD 126 H; 274-6772
Required Texts (available in paperback at bookstore and online outlets):


Additional Journal Readings for PSY 615 (Goodlett), Spring 2013

The following journal article readings on designated topics will help provide depth of knowledge and will are assigned to cover specific topics from the books. These articles have been (or will be) posted on Oncourse under the “Resources” link. This list may be modified.

Perception and Consciousness


Memory Systems


Memory Mechanisms


Adult Neurogenesis


Psychosurgery

PSY 398 SYLLABUS, Spring 2013


**Autism & Mirror Neurons**


20. TBA

**Reward, Risk and Decision Making**


**Pain**


**Major Paper**  Research paper (about 3500 words, plus references and any figures, double spaced). The focus of the paper must be derived from a topic or some aspect of cognitive and behavioral neuroscience representing content relevant to the course, or from an interest that you have in behavioral neuroscience. Topics concerning abnormal functioning, behavioral or mental disorders, effects of drug abuse, cognitive dysfunction, or developmental disorders are typically popular, but the neurobiology of normal behavioral functions or processes can also be chosen (e.g., working memory; spatial cognition; language development). The paper should address the essential behavioral features and fundamental neuroscience of the phenomenon of interest, including discussion of the key current and past empirical studies and the types of experimental methods (e.g., gene targeting at molecular level; functional neuroimaging at systems level) applied to the problem. Focus on the current state of knowledge about the problem, including (when possible) how basic neuroscience research has opened vistas to real-world applications to the phenomenon (e.g., treatment, intervention). **The key to a successful paper is to develop a focused perspective on a topic of interest to you, one that addresses** The paper has no set page limits, but it should be efficiently written; suggested guidelines are about 10-12 pages of text (1-inch margins, double spaced), using current and historically important references from the primary literature. References to review articles or book chapters should be kept to a minimum.

**Neuroscience in the News**  Reports about new neuroscience findings abound in the media these days, appearing almost daily. This assignment is for you to identify an online report in tradition outlets (news reports, telecasts, magazines, etc.) that reports a finding of interest to behavioral neuroscience, get the original publication on which it is based, and then write a summary of the publication. You will then be asked to give a 5 minute presentation of the published research to the class (with 3-4 slides) describing the findings and their importance (e.g., why the media reported it). More instructions can be found in the assignments link.
Sample Paper Topics (other topics may also be quite suitable).

AIDS dementia
Affective disorders - mood disorders
  Bipolar disorder (manic-depressive)
  Depression
  Mania
  Seasonal affective disorder
Aging (non-pathological)
Amnesia
Anxiety or Panic Disorders
Aphasia Developmental Language Disorders
Attention Deficit Hyperactivity Disorder
Autism
Brain damage and Plasticity (Stroke;
  Traumatic head injury; tumors; spinal
cord injury)
Critical Periods in Brain Development
Drug Abuse and Addiction (including
  neuroadaptive processes or
  pathophysiological consequences)
  Alcoholism
  Stimulant abuse and dependence
  Ecstasy
  Opiate abuse and dependence
Eating and Weight Regulation Disorders
  (obesity; anorexia; bulimia)
Epilepsy and seizure disorder
Gene Therapy

Ischemic Injury and Stroke
Language and Speech (Normal or Disorders)
Multiple Sclerosis and demyelinating diseases
Neurodevelopmental Disorders
  Down's syndrome
  Fetal Alcohol Syndrome
  Other drug-induced developmental disorders
  Attention Deficit Disorder (ADD/ADHD)
Neglect Syndromes
Neurodegenerative disease
  Alzheimer's disease
  Huntington's disease
  MPTP neurotoxicity
  Parkinson's disease
  Prion Diseases
  Wernicke/Korsakoff’s Syndrome
Neuroprotection
Nutritional effects on Behavior
Regenerative Neurobiology (Stem Cell and Fetal
  Tissue Transplant)
Schizophrenia
Sex Differences in Brain Development/Function
Sexual Behavior and Sexual Orientation
Spatial Cognition
Stem Cells
Stress Adaptation and Pathophysiology
Tourette's syndrome
Working Memory

Performance and Grades: Exams are considered teaching tools to enhance your assimilation of knowledge.
The paper and presentation are means to acquire depth of knowledge in areas of interest and to gain
experience in critically important skills of written and oral communication. 630 points total, 90-80-70%
scale (+/-'s will be used).
Exams (3; 100 points each)  300
Major paper  100
Class Participation and Class Assignments  150
Book Review and Discussion of My Lobotomy  50
Neuroscience in the News  30