Psychology 499-R and 712-R
Neuroimaging Analysis in Psychological Science
Section 001 – 3.0 credits
FALL 2014

Class: Wednesday 2:00 pm – 4:50 pm  147 McDonald Building (MB)

Instructors: Erin D. Bigler, Ph.D. and Naomi J. Goodrich-Hunsaker, Ph.D.
E-mail: erin_bigler@byu.edu     naomi.hunsaker@byu.edu
Phone: 422-4289     422-4287 (leave a message)
Office: 1190D SWKT
Office Hours: by appointment     by appointment
TA: Neal Ball
E-mail: neal.k.ball@gmail.com
Phone: (707) 474-2313 (text works best)
Office: Brain Imaging & Behavioral Lab 1120 SWKT
Hours: by appointment

Course description: An introduction to imaging analyses used in psychological science and the study of the brain.
Prerequisite: Psych 585 or equivalent or Neuro 360 or equivalent

Text: No text; various readings and on-line assignments will be assigned

Course Objective: The objective of this course is to master image analysis techniques used in psychological science, cognitive neuroscience and clinical neuropsychology. Understanding normal brain anatomy and how to quantify brain imaging findings is critical for understanding neuropathological conditions and their implications for neurological and neuropsychiatric disorders.

BASIC COURSE OUTLINE:
1. 3 Exams (3 X 100 = 300 pts): There will be 3 exams given in class worth 100 points each – see Course Schedule for details. Study guides will be given before each.

2. Review Paper (150 pts): A brief review paper (10 pages or less) on how to best image a particular kind of disorder and/or region of interest (ROI) or how to use neuroimaging techniques in the study of neurological or neuropsychiatric disorders is required by the end of the semester (last day of class). Make sure that relevant connections with neuropsychological test findings and neuropsychiatric disorders are made and cited properly.

As part of your graduate training, it is important that you become experts on APA style of formatting. Before you present your work to the class, you are required to complete the following PPT tutorials on APA style. These cover changes in the new APA publication manual.

http://flash1r.apa.org/apastyle/basics/index.htm

http://flash1r.apa.org/apastyle/whatsnew/index.htm
3. **FINAL EXAM (200 pts – Monday, December 15th, 2:30pm – 5:30pm, 147 MB):**
   A project assignment will be given requiring demonstration of the basic skill levels covered in the class. This will constitute the Final Exam and will be due on the day listed above.

**Grade Components:**

**Exams/Grades:**

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
<th>Description</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>93.0%</td>
<td>3 Regular Exams (3 X100 points each)</td>
<td>300</td>
</tr>
<tr>
<td>A-</td>
<td>89.5%</td>
<td>Final Exam</td>
<td>200</td>
</tr>
<tr>
<td>B+</td>
<td>87.5%</td>
<td>Class Presentation</td>
<td>150</td>
</tr>
<tr>
<td>B</td>
<td>83%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B-</td>
<td>80%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C+</td>
<td>77.5%</td>
<td>TOTAL Points</td>
<td>650</td>
</tr>
</tbody>
</table>

**COURSE OUTLINE:**

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-Sept</td>
<td>Basic Neuroanatomy for neuroimaging analysis – OSIRIX and Clear Canvas Navigation and creation of personal neuroanatomy powerpoint. Overview of MRI.</td>
</tr>
<tr>
<td>17-Sept</td>
<td><strong>Exam 1 (1st hour).</strong> Introduction to coding. <strong>PowerPoint Atlas DUE</strong> (worth 30 pts of EXAM 1)</td>
</tr>
<tr>
<td>24-Sept</td>
<td>How to use the Mango app to replace ROIs; T1 preprocessing steps – the how and why</td>
</tr>
<tr>
<td>1-Oct</td>
<td>Hippocampus semi-automated method; Learning-based software (SegAdapter) that automatically learns</td>
</tr>
<tr>
<td>8-Oct</td>
<td><strong>Exam 2 (1st hour).</strong> FreeSurfer – Part 1 (generating data)</td>
</tr>
<tr>
<td>15-Oct</td>
<td>FreeSurfer – Part 2 (analyses including QDEC)</td>
</tr>
<tr>
<td>22-Oct</td>
<td>FreeSurfer – Part 3 (supercomputer)</td>
</tr>
<tr>
<td>29-Oct</td>
<td>MindBoogle – Improve the accuracy of FreeSurfer labeling</td>
</tr>
<tr>
<td>5-Nov</td>
<td><strong>Exam 3 (1st hour using FreeSurfer).</strong> VBM with SPM – Part 1 (generating data)</td>
</tr>
<tr>
<td>12-Nov</td>
<td>DBM with ANTs – Part 1 (generating data)</td>
</tr>
<tr>
<td>19-Nov</td>
<td>VBM with SPM – Part 2 (analyses)</td>
</tr>
<tr>
<td>26-Nov</td>
<td>NO CLASS – HOLIDAY – Thanksgiving</td>
</tr>
<tr>
<td>3-Dec</td>
<td>DBM with SPM – Part 2 (analyses)</td>
</tr>
<tr>
<td>10-Dec</td>
<td>Research Design and Wrap-up; <strong>Review Paper DUE</strong></td>
</tr>
<tr>
<td>12-13-Dec</td>
<td>Reading days</td>
</tr>
<tr>
<td>15-Dec</td>
<td><strong>FINAL EXAM (Monday, December 15th, 2:30pm – 5:30pm, 147 MB)</strong></td>
</tr>
</tbody>
</table>
Other Issues:

**Electronic devices** - All cell phones should be turned off in class and computers are welcome as long as you are taking notes and not distracting others (surfing the web, answering email, playing games etc.) Thank you.

**Academic Honesty** - I fully support the Honor Code and expect the same from you. It is the university’s expectation, and my own expectation in class, that each student will abide by all Honor Code standards. Please call the Honor Code Office at 422-2847 if you have questions about those standards. While all students sign the honor code, there are still specific skills most students need to master over time in order to correctly cite sources, especially in this new age of the internet; as well as deal with the stress and strain of college life without resorting to cheating. Please know that as your professor I will notice instances of cheating on exams or plagiarizing on papers. See [http://www.byu.edu/honorcode](http://www.byu.edu/honorcode) for specific examples of intentional, inadvertent plagiarism, and fabrication or falsification.

**Student Learning Outcomes** - Each program at BYU has developed a set of expected student learning outcomes. These will help you understand the objectives of the curriculum in the program, including this class. To learn the expected student outcomes for the programs in this department and college go to [http://learningoutcomes.byu.edu](http://learningoutcomes.byu.edu) and click on the College of Family, Home and Social Sciences and then this department. We welcome feedback on the expected student learning outcomes. Any comments or suggestions you have can be sent to [FHSS@byu.edu](mailto:FHSS@byu.edu).

**Discrimination** - Title IX of the Education Amendments of 1972 prohibits sex discrimination against any participant in an educational program or activity that receives federal funds. Title IX covers discrimination in programs, admissions, activities, and student-to-student sexual harassment. BYU’s policy against sexual harassment extends not only to employees of the University but to students as well. If you encounter unlawful sexual harassment or gender based discrimination, please contact the Equal Employment Office at 422-5895 or 367-5689 (24-hours) or contact the Honor Code Office at 422-2847.

**Students with Disabilities** - BYU is committed to providing a working and learning atmosphere which reasonably accommodates qualified persons with disabilities. If you have any disability which may impair your ability to complete this course successfully, please contact the Services for Students with Disabilities Office at 422-2767. Reasonable academic accommodations are reviewed for all students who have qualified documented disabilities. Services are coordinated with the student and instructor by the SSD office. If you need assistance or if you feel you have been unlawfully discriminated against on the basis of disability, you may seek resolution through established grievance policy and procedures. You should contact the Equal Employment Office at 422-5895, D-282 ASB.
Psychology 712-R Neuroimaging Analysis Fall 2014
PowerPoint Atlas Required to be Turned-in by First Exam

Lobes
- Frontal
- Temporal
- Parietal
- Occipital

Coronal
- Cingulate Gyrus
- Corpus Callosum
- Frontal Horn of the Lateral Ventricle
- Septum pellucidum
- Caudate
- External capsule
- Extreme capsule
- Internal capsule
- Putamen
- Globus Pallidus
- Claustrum
- Fornix
- Insular cortex
- Anterior commissure
- Mamillary body
- Thalamus
- Third ventricle
- Pons
- Hippocampus
- Amygdala
- Cerebral peduncle
- Parahippocampal Gyrus
- Fusiform Gyrus
- Inferior Temporal Gyrus
- Medial Temporal Gyrus
- Superior Temporal Gyrus
- Temporal Stem
- Temporal Horn of the Lateral Ventricle
- Superior Colliculus
- Inferior Colliculus
- Atrium of the Lateral Ventricle
- Insula

Sagittal
- Hippocampus
- Corona radiata
- Lateral ventricle
- Third ventricle
- Fourth ventricle
- Corpus callosum
- Fornix
- Thalamus
- Pons
- Medulla
- Substantia nigra
- Anterior commissure
- Red nucleus
- Infundibulum
- Optic chiasm
- Cerebellar Peduncle
- Putamen
- Caudate
- Atrium of Lateral Ventricle
- Temporal Horn of the Lateral Ventricle
- Frontal Horn of the Lateral Ventricle
- Amygdala

Axial
- Corona radiata
- Corpus callosum
- Central sulcus
- Caudate
- Internal capsule
- Extreme capsule
- External capsule
- Fornix
- Globus pallidus
- Putamen
- Thalamus
- Claustrum
- Lateral Ventricle
- Third Ventricle
- Mammillary body
- Cerebral peduncle
- Sylvian (Lateral) fissure