Marquee: Cognition in Sensory Cortex
Spring 2024 (16:185:600:01 & 16:830:638:01)

Class Time: Tuesdays 10am-1pm, Psychology (Busch) A139

Instructors:
Dr. Phil Parker
Office: PSYCH 225
Email: phil.parker@rutgers.edu

Dr. Kasia Bieszczad
Office: PSYCH 327
Email: kasia.bie@rutgers.edu

Office Hours: Wednesday afternoons (3:00-4:00pm) starting 1/24

Grading: You will receive a letter grade based upon in-class participation in paper discussions, weekly quizzes, and oral/written final project evaluations. There will not be a final exam.

Course Rationale: Sensory areas contain a diversity of signals beyond feedforward sensory inputs, and higher-level “cognitive” areas contain sensory representations even at rest. Such modern findings challenge textbook views of the brain that traditionally compartmentalize function along unitary modalities. For example, a compartmentalized view says the job of the visual cortex is to process visual input from the retina, and the job of the prefrontal cortex is cognitive control of behavior. Yet, as physiological preparations have advanced from anesthetized to awake, freely behaving brain signal recordings, this parcellated view of the brain is beginning to deteriorate. How are we to make sense of the brain given the weakening of boundaries between the components of traditional models?

Course Aims and Outcomes: This course will take an interdisciplinary approach to cover classical and modern studies of cognitive and sensory processing to construct an updated model of the brain not as a sensorimotor arc, but as an organ that learns to anticipate inputs and control behavioral outputs under a variety of external and internal contexts. In other words, sensory cortex has much less of a passive “receptive” role, and rather functions as an interactive and predictive processor. Each of the five “classic” sensory modalities and their associated primary sensory cortical region, along with theoretical and computational models of cortical function, will be covered by the course instructors and outside lecturers. Formal auditing and informal “sitting in” will be highly encouraged. The ultimate goal of the course will be the composition of a review article, written together by the enrolled students and faculty, that will be submitted for publication.

Quizzes (25% of grade): A short weekly quiz on Canvas will cover key learning objectives in the format of several multiple answer questions and a short answer question.

Participation (25% of grade): All students will be expected to participate in discussion during the class period. Absences must be reported to the instructors.

Final Projects (50% of grade): There will be four assignments toward a written contribution to a RuCCS Marquee Consortium review article (4,000 words per student for a 12,000 word review article). Students will work in randomly selected groups for each topic. Each student will participate in two topics.

- Part 1 (01/30, Emerging Themes and Principles, 10%): Establishing what this review will cover with a structure for the Consortium paper based on the individual sections. After a short overview, students will engage in a writing exercise that will be submitted at the end of class for evaluation.
- Part 2 (3/19, Synthesis I, 15%): Group writing on one of the first three topics (vision, gustation, olfaction). A 2,000 word draft will be submitted for evaluation.
- Part 3 (4/23, *Synthesis II*, 15%): Group writing on one of the second three topics (somatosensation, audition, computation). A 2,000 word draft will be submitted for evaluation.
- Part 4 (05/07, *Group Presentations*, 10%): Groups present final article section with one figure per topic.

**Learning Objectives:**
- Critically understanding a deep and broad review of scientific literature
- Developing critical thinking “on your feet” by active engagement in scientific discourse in the classroom
- Mastering writing skills in the synthesis of relevant concepts in cognition, psychology, and neuroscience
- Practice team-based project management and productivity
- Develop an appreciation for the variety of complementary techniques, approaches, frameworks, and levels of analysis that contribute to our understanding of neural and cognitive function

**Course Materials:**
*Research papers:* Review and/or primary research articles will be assigned each week (see Course Schedule below). PDFs for each paper will be available in Canvas. [Example guide](#) of how to read a paper.

*Final project literature and writing resources:* [Library resources; Google Scholar](#).

**Complementary activities:** The classroom will be open to the Rutgers community and promoted to engage RuCCS trainees and faculty to join in on discussion. Guest lectures will be advertised broadly to RuCCS and psychology/neuroscience listservs to increase attendance and provide opportunity for multidisciplinary interactions across units. When possible, the class will coincide with the RuCCS colloquium series which will provide lunch for sessions with scheduled visiting lecturers. Opportunities for laboratory visits will be scheduled outside of regularly scheduled class times to provide hands-on interaction with modern approaches in the sensory sciences. Enrolled students who participate in laboratory visits will be eligible for extra credit.

**Course Schedule:**

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Discussion Leader(s)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>01/16</td>
<td>What is cortex? Anatomy, physiology, evolution, development, computation</td>
<td>Parker/Bieszczad</td>
<td></td>
</tr>
<tr>
<td>01/23</td>
<td>Vision</td>
<td><a href="#">Farran Briggs</a></td>
<td></td>
</tr>
<tr>
<td>01/30</td>
<td>Emerging themes &amp; principles</td>
<td>Bieszczad/Parker</td>
<td>Assignment due by end of class</td>
</tr>
<tr>
<td>02/06</td>
<td>Gustation I</td>
<td>Bieszczad/Parker</td>
<td></td>
</tr>
<tr>
<td>02/13</td>
<td>Gustation II</td>
<td><a href="#">Paul Breslin</a></td>
<td></td>
</tr>
<tr>
<td>02/20</td>
<td>Olfaction I</td>
<td>Bieszczad/Parker</td>
<td></td>
</tr>
<tr>
<td>02/27</td>
<td>Olfaction II</td>
<td><a href="#">Matt Smear</a></td>
<td></td>
</tr>
<tr>
<td>03/05</td>
<td>Somatosensation I</td>
<td><a href="#">Ella Striem-Amit</a></td>
<td></td>
</tr>
<tr>
<td>03/12</td>
<td>Spring Break</td>
<td></td>
<td></td>
</tr>
<tr>
<td>03/19</td>
<td>Synthesis I - Review article planning</td>
<td>Parker/Bieszczad</td>
<td>Assignment due by end of class</td>
</tr>
</tbody>
</table>
Academic Integrity: Each student in this course is expected to abide by the Rutgers University Code of Student Conduct and Academic Integrity Policy. Any work submitted by a student in this course for academic credit will be the student's own work. For this course, collaboration is allowed in the following instances: group-work, paper presentation brainstorming, practice talks, in- and out-of classroom paper discussions, or other instances based upon special requests and instructor approval. Visit this site for more info and useful links: [http://academicintegrity.rutgers.edu/resources-for-students](http://academicintegrity.rutgers.edu/resources-for-students).

Should copying or any form of plagiarism occur, both the student who copied work from another student or resource and the student who gave material to be copied could both automatically receive a zero for the assignment. Penalty for violation of the University Code of Student Conduct can also be extended to include failure of the course and University disciplinary action. *The risk really isn’t worth it.*

As a Rutgers graduate student, and as a member of the academic community, it is your goal to:

- properly acknowledge and cite all use of the ideas, results, or words of others
- properly acknowledge all contributors to a given piece of work
- make sure that all work submitted as his or her own in a course or other academic activity is produced without the aid of unsanctioned materials or unsanctioned collaboration
- treat all other students in an ethical manner, respecting their integrity and right to pursue their educational goals without interference. This requires that a student neither facilitate academic dishonesty by others nor obstruct their academic progress (reproduced from: [http://academicintegrity.rutgers.edu/academic-integrity-at-rutgers/](http://academicintegrity.rutgers.edu/academic-integrity-at-rutgers/)).

Violations of academic integrity will be treated in accordance with university policy, and sanctions for violations may range from no credit for the assignment, to a failing course grade to (for the most severe violations) dismissal from the university.

Use of artificial intelligence tools:
AI tools such as ChatGPT can be useful for improving wording and inspiring ideas for future investigation, however their use for generating text for class assignments is not advised. Current large language models do not typically produce accurate information when queried, including false statements and non-existent bibliographic references, and their use can mislead you and prevent you from understanding the material you are expected to master for this course. Therefore, these tools are not ideally suited for writing or other assignments in this course.
**Accommodations for students with disabilities:** In compliance with the Rutgers University policy and equal access laws, we are available to discuss appropriate academic accommodations that may be required for students with disabilities. Requests for academic accommodations are to be made during the first two weeks of the semester, except for unusual circumstances, so arrangements can be made. Students are encouraged to register with the RU Office of Disability Services to verify their eligibility for appropriate accommodations and provide me with appropriate documentation. *We will be able to make arrangements for you!*

**Inclusivity Statement:** We understand that our members represent a rich variety of backgrounds and perspectives. RuCCS and the Psychology Department are committed to providing an atmosphere for learning that respects diversity. While working together to build this community we ask all members to:

- share their unique experiences, values and beliefs
- be open to the views of others
- honor the uniqueness of their colleagues
- appreciate the opportunity that we have to learn from each other in this community
- value each other’s opinions and communicate in a respectful manner
- use this opportunity together to discuss ways in which we can create an inclusive environment in this course and across the Rutgers U. community