Gero 599: Cognitive Neuroscience of Aging

Course location: Gero 224  
Meeting time: Thursdays 2-4:50 PM  
Instructor: Mara Mather, Ph.D.  
Office hours: Mondays 2:30-3:30 PM and by appointment (Gero 216b)

Overview: How does the brain change as we age and what are the implications for cognition? This course covers new developments in research in cognitive neuroscience and aging, with a focus on the consequences for memory and emotion.

Course Requirements

A. Come up with discussion questions about the articles before the seminar and participate fully in the seminar discussion. As part of this requirement, you will need to email me at least one question about each of the readings by 3 PM the day before each class. In addition, you should bring a printout of these questions and try to raise at least one of them during the class discussion.

Grading criteria: 1) How clear/comprehensible are the questions? 2) Are the questions thought provoking? 3) Do the questions have “right” answers that only an expert would know? (Avoid these—they rarely are good discussion questions.) 4) Do the questions highlight something interesting in the readings that might not have been noticed by others?

B. Four course presentations (you will be assigned dates spread throughout the semester). Each presentation will be strictly limited to 10 minutes (shorter presentations that leave more time for discussion are fine) except for #4, which will be limited to 15 minutes.

1. New experiment design: Design a study investigating some aspect of the cognitive neuroscience of aging and present the research proposal to the group.

Grading criteria: 1) How effectively does the presentation convince the audience that the question is interesting and important? 2) Does the study have a testable hypothesis? 3) Are there clear predictions for the study? 4) Does the plan effectively test the research hypotheses? 4) How easily can the audience understand the design of the study?

2. Address the session topic with some additional research findings: Present a summary of one or more studies (not already assigned in our reading list) that you believe help address the question posed for that day’s discussion session.

Grading criteria: 1) How clearly does the presentation describe the related findings in the literature? 2) How effectively does the presentation help answer the session topic question?
3. **Convey some other related findings:** Tell the group about some interesting research findings related to the cognitive neuroscience of aging that are not covered in this seminar. Along with this, you should turn in a citation for an article (not already on the syllabus) that you would like the group to discuss on the last day of the course. You should include a short explanation of why you would like to include this article. This citation can be any article related to the course material. We will vote on which articles to read. If your suggestion is chosen, you are responsible for lending the group a master copy.

**Grading criteria:** 1) How interesting is the presentation? 2) How effectively did we learn about the topic?

4. **Get your classmates involved:** Take over the seminar for 15 minutes once during the quarter and engage your classmates in an interactive activity related to the week’s readings, whether it is a debate, quiz about the readings, small group discussions or some other activity. Also, turn in a one-page summary of the activity by 3 PM Tuesday two days before the session meets.

**Grading criteria:** 1) How interesting was the activity? 2) Did the activity help seminar members learn something new about the topic, solidify knowledge of something in the readings, or clarify something confusing? 3) Was the activity plan clear and comprehensible? 4) Was the activity plan turned in on time? 5) Extra credit – was the activity fun?

**Tips for your presentations:**

1. Speak through it out loud beforehand to make sure the timing is right.
2. Make it interesting! Tell us why you think the topic is exciting, new or different.

**C. Questions for classmates’ presentations:** At the end of each class, turn in at least one written question for each of the presentations made that day (questions are not required for the group activity presentation type).

**Grading criteria:** 1) How clear/comprehensible are the questions? 2) Are the questions thought provoking? 3) How important is the question for the topic being presented?

This seminar will not have a final exam or paper.

**Final grade composition:**

Grades on the questions emailed before the discussion, the four presentations and the questions turned after class will each contribute 1/6 of the final grade. Your lowest grade on one set of emailed questions and one set of in-class questions will be dropped. Thus, if you miss one seminar meeting, there will be no penalty.
If you miss more than one seminar meeting, you may write a short response (1-3 paragraphs) to each of the readings for the missed meetings to make up for the missed in-class questions. This should not be a summary of the readings, but instead a response to them. This could be either 1) an evaluation of the methods, results or interpretation; 2) a discussion of how something brought up in the article relates to other findings; or 3) how it has further implications not discussed in the article.

**Cognitive Neuroscience of Aging Course Topics**

2. Jan. 24: What changes most with age cognitively and how are these changes related to how the brain ages? (Persson et al., 2006; Salthouse, 2004; Raz, 2004; Sowell et al., 2003; Hedden & Gabrieli, 2004)
5. Feb. 14: How can we explain deficits in memory binding among older adults? (Howard, Kahana, & Wingfield, 2006; Mitchell et al., 2000; Mitchell, Raye, Johnson, & Greene, 2006; Li, Naveh-Benjamin, & Lindenberger, 2005)
6. Feb. 21: Are there cultural differences in cognitive aging? (Goh et al., 2007; Park & Gutchess, 2006)
7. Feb. 28: Why does cognition slow down with age? (Salthouse, 2000; Walhovd & Fjell, 2007)
8. Mar. 6: Why does brain activity become more bilateral with age? (Buckner, 2004; Daselaar & Cabeza, 2005; Erickson et al., 2007)
9. Mar. 13: How does emotion regulation become more effective with age? (Mather & Carstensen, 2005; Mather & Knight, 2005; Williams et al., 2006)
10. Mar. 20: SPRING BREAK
11. Mar. 27: Can mental exercise prevent cognitive decline in aging and, if so, how? (Gatz, 2005; Mahncke et al., 2006; Shimamura et al., 1995; Stern et al., 2008; Stern, 2006)
12. April 3: Does physical exercise prevent cognitive decline in aging and, if so, how? (Baltes & Lindenberger, 1997; Colcombe et al., 2004; Korf, White, Scheltens, & Launer, 2004; Raz, Rodrigue, & Haacke, 2007; Stampfer, 2006; Winter et al., 2007)
13. April 10: Guest lecture: Tuck Finch; How do synaptic changes affect cognition in aging? (Finch, 2007; Morgan et al., 1987; Teter & Finch, 2004)
14. April 17: Guest lecture: Christian Pike; How do hormones influence cognitive aging? (additional readings to be determined; Sherwin, 2007)
15. April 24: What are the factors influencing neurogenesis in adulthood? (Gould, 2007; Gross, 2000) And what role does stress play in cognitive aging? (Hawkley et al., 2005; Lupien et al., 2005)
16. May 1: Class selection of readings
Reading List


