SYLLABUS for HDE 100C - Honors, Winter 2019 [version 1/09/2019]

Adult Development and Aging, with emphasis on Successful Mind & Brain Aging
Professor Beth A. Ober
Class sessions: Mondays & Wednesdays, 12:10-2:00, 1134 Bainer Hall
Ober's Office Hours: Mondays 2:30-3:30, Thursdays 1:00-2:00, & by appointment
Ober's Office Location: 1357 Hart Hall

REQUIRED READINGS:
All required readings (book chapters, journal articles, etc.) will be posted in a clearly-labeled folder on CANVAS. Recommended readings will also be posted on CANVAS, in a separate, clearly-labeled folder.

COURSE SCHEDULE:

**MODULE 1**, January 7 & 9: Overview & introductory materials
- Overview of course organization and goals
- Theoretical principles of lifespan human development
- Methods for studying lifespan human development
- Introduction to normal versus abnormal brain and cognitive aging

Readings for January 7:

Readings for January 9:

**MODULE 2**, January 14 & 16: Biological Foundations
- Biological theories of aging
- Brain changes associated with normal vs. abnormal aging

Readings for January 14:
Discussion Questions for January 14:

1. Which of the "programmed" theories of aging (changes in gene expression that follow a biological timetable) have more versus less empirical support and why?
2. Which of the "damage or error" theories of aging (environmental assaults that induce cumulative damage over time) have more versus less empirical support and why?

Readings for January 16:

Discussion Questions for January 16:
Which of the many extant theories of biological aging can help to explain aging-related (normal vs. abnormal) brain changes? a. structural brain changes  b. functional brain changes

UCD HOLIDAY, January 21 (Mon.): NO CLASS

MODULE 3, January 23 & 28: Physical activity and successful aging
- Correlational (observation-based) versus causal (experiment-based) data
- Evidence for structural and/or functional brain changes as a function of physical activity
- Evidence for memory and/or other cognitive changes as a function of physical activity
- Proposed mechanisms for the effects of physical activity on brain and cognition
- Limitations and future directions

Readings for January 23:

Readings for January 28:


Recommended readings:
2) Lovden et al. (2013). Structural brain plasticity in adult learning and development. *Neuroscience and Biobehavioral Reviews, 37*, 2296-2310. [section 2.2, and Figure 2, are most relevant to what will be covered in lecture]

- **Presentations of Group Projects in Class, January 30 (Wed),** based on these questions:
  1. Which aspects of brain **structure** seem to benefit from physical activity? Moreover, which types of physical activity seem to be most effective?
  2. Which aspects of brain **function** seem to benefit from physical activity? Moreover, which types of physical activity seem to be most effective?
  3. Which types of physical activity seem to improve cognition? Which specific types of cognition (i.e., which types of memory, attention, executive function, etc.) seem to be improved?
  4. What might be the mechanisms by which certain types of physical activity can improve cognition, via improvements in brain function and/or structure?
  5. How strong (vs. weak) is the evidence for physical activity playing a causal role in delaying the onset of deficits in brain and/or mind functioning (e.g., onset of MCI and/or dementia) in older adults?

**Midterm Exam #1: February 4 (Mon), at beginning of class session**

**MODULE 4, February 4 & 6: Cognitive Foundations**
- General cognitive functioning
- Memory functioning: Working, Episodic, Semantic, Procedural
- Linkages of memory functioning to brain changes

Readings for February 4:

Recommended reading:

Discussion Questions for February 4:
1. Which aspects of **general cognitive functioning** show declines in normal aging and which are preserved?
2. What about abnormal aging (e.g., Alzheimer's disease).
3. How do changes in general cognitive functioning align with the changes in brain structure and function (in normal vs. abnormal aging) that we discussed earlier in the quarter?

Readings for February 6:

Recommended reading:

Discussion Questions for February 6:
1. Which aspects of memory functioning show declines in normal aging and which are preserved?
2. What about abnormal (especially AD) compared to normal aging?
3. How do changes in memory functioning align with the changes in brain structure and function (in normal vs. abnormal aging) that we discussed earlier in the quarter?

**MODULE 5, February 11 & 13:** Cognitive activity and successful aging
- Correlational (observation-based) versus causal (experiment-based) data
- Issues regarding transfer (near vs. far) to untrained cognitive abilities
- Issues regarding duration of training-related improvements
- Issues regarding ethics of commercial, computer-based "brain-training" program
- Superagers' mind and brain: differences from normal older adults

Readings for February 11:

Readings for February 13:

Recommended reading:

**February 15 (Fri): PAPER TOPIC & OUTLINE DUE on CANVAS, 6:00pm**

**UCD HOLIDAY, February 18 (Mon.): NO CLASS**

- **Presentations of Group Projects in Class, February 20**, based on these questions:
1. What types of cognitive training tasks show promise for improving overall cognitive outcomes in aging? How and why? Be sure to discuss issues related to transfer to non-trained tasks/abilities?

2. What type of cognitive training tasks show promise for improving memory functioning in aging? How and why? Be sure to discuss issues related to transfer to non-trained tasks/abilities?

3. How do the various types of training (e.g., in-person, online, "real-world" activity) compare in terms of outcomes and durability?

4. Is it possible that cognitive training tasks (especially computerized tasks) in young and/or middle adulthood could have an impact on cognitive functioning in late adulthood? What might be the mechanisms for this?

**Midterm Exam #2: February 25 (Wed), at beginning of class session**

**MODULE 6, February 25: Socio-emotional foundations**
- Social relationships & social support
- Linkages between social support and health
- Socioemotional Selectivity Theory (SEST) & aging-related positivity effects

Readings for February 25:

Discussion Questions for February 25:
1. What is the evidence for beneficial effects of social networks/support on physical health?
2. What is the evidence for beneficial effects of social networks/support on mental/emotional health and well-being?
3. What are the strengths versus limitations of SST for explaining social aspects of adult development and aging?
4. What are the strengths versus limitations of the SST for explaining cognitive aspects of aging?

**MODULE 7, Feb 27:** Social activity and successful aging; social and affective context for cognitive aging
- Correlational (observation-based) versus causal (experiment-based) data
- Effects of social engagement/support (direct and indirect) on cognition
- Effects of social engagement/support (direct and indirect) on brain structure/function
- Issues regarding multidimensional aspects of social activity (i.e., involvement of physical and cognitive activity, as part of social activity)
- Impact of social engagement/support on mood, depression, stress, etc., which, in turn, can have effects on cognition and brain
How the consideration of the principles of SEST could play a role in the design and implementation of social engagement studies.

Readings for Feb 27:

Recommended readings:

Discussion Questions for Feb 27:
1. What are the strengths versus limitations (including "gaps") regarding evidence for beneficial effects of social activity/support on cognitive function?
2. What are the strengths versus limitations (including "gaps") regarding evidence for beneficial effects of social activity/support on brain function?
3. What are some potential mechanisms by which cognitive and social activity are interactive in their influence on mind and brain aging?
4. How might social and/or emotional context provide support for cognitive and brain function in older adults?
5. What might be the benefits of incorporating social and/or affective components into physical- and/or cognitive-intervention studies? Why?

**MODULE 8, March 4:** Nutrition’s impact on mind and brain aging
- Nutritional cognitive neuroscience & applications to healthy brain aging
- Biochemical markers of dietary intake
- Nutrient biomarker patterns
- Nutrition and structural brain aging
- Nutrition and functional brain aging

Reading for March 4:

Discussion Questions for March 4:
1. How might interactions between individual nutrients benefit the aging brain?
2. How might variability in both diet and brain aging be captured and then linked to patterns of healthy (vs. unhealthy) brain aging in precise and comprehensive ways?

3. How might well-known moderating variables—including age, genes, environment, and lifestyle—determine nutrition’s impact on cognitive function and brain health?

➢ Presentations of Group Projects, in Class, March 6 (Wed), based on these questions:

Question Set on Social Engagement, Affective Influences, and Nutrition:
1. What are some of the neuropsychosocial pathways by which social engagement can support/improve cognitive and/or brain function? More specifically,
   a. how might immune function (and thus resistance to diseases that can affect the brain) be affected?
   b. how might behavioral compensation mechanisms be affected?
   c. how might neuroplasticity (i.e., brain compensation/neuroplasticity) be affected?
   d. how might mood and/or life-satisfaction be affected which in turn could support/improve cognitive and/or brain function?
2. What are some of the neuropsychosocial pathways by which emotional/affective contexts for cognitive processing (e.g., in the domains of attention, memory, or language) can support/improve cognitive processing in any given domain of cognition?
3. What might be the brain underpinnings (structural and/or functional) for emotional/affective contexts being helpful to cognitive processing (as per #2)?
4. What are some of the most exciting, recent developments in the role of nutrition on cognitive aging? On brain aging?

Midterm Exam #3: March 11 (Mon), at beginning of class session

MODULE 9, March 11 & 13:
Putting it all together: recommendations for successful aging of mind & brain

Readings for March 11 & 13:
2) Greenwood, P.M. and Parasuraman, R. (2012). Nurturing the Older Brain and Mind, Chapter 13 - What Can and What Should Be Done to Support Cognitive Vitality in Older Adults?

Recommended reading:

INDIVIDUAL RESEARCH PAPERS DUE Friday, March 15, 6:00pm, via CANVAS
These papers will be 6.5 - 7.5 pages (double-spaced) in length and will focus on a comparison of two types of treatment or training on cognitive and/or brain function in older adults. Both of your chosen treatments will involve one (and only one) of the following: physical activity, cognitive activity, social activity, or nutrition. Your specific topic, with independent (treatment/training) variables and dependent (outcome) variables described, along with an outline for the paper, need to be approved by Prof. Ober, by the end of the 5th week of instruction.

**FINAL EXAM** (cumulative), **Friday, March 22, 1:00-3:00pm**

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**Grading Rubric for Course**

- In-Class Participation: 10%
- Group Presentations (4% x 3): 12%
- Online Participation, via Threaded Discussions (1% x 8): 8%
- Individual Research Paper: 24%
- Midterm exams (10% x 3): 30%
- Final exam: 16%
- **TOTAL = 100%, with letter grades assigned in standard manner**

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"**Quick List" of Class Dates linked to Modules/Group Presentations/Exams/etc."

- January 7 (Mon): Module 1
- January 9 (Wed): Module 1
- January 14 (Mon): Module 2
- January 16 (Wed): Module 2
- January 21 (Mon): UCD HOLIDAY - no class
- January 23 (Wed): Module 3
- January 28 (Mon): Module 3
- January 30 (Wed): Presentation of **Group Projects** on Physical Activity
- February 4 (Mon): **Midterm #1**, beginning of class; Module 4
- February 6 (Wed): Module 4
- February 11 (Mon): Module 5
- February 13 (Wed): Module 5
- February 15 (Fri): PAPER TOPIC & OUTLINE DUE on CANVAS, 6:00pm
- February 18 (Mon) UCD HOLIDAY - no class
- February 20 (Wed): Presentation of **Group Projects** on Cognitive Activity
- February 25 (Mon): **Midterm #2**, beginning of class; Module 6
- February 27 (Wed): Module 7
- March 4 (Mon): Module 8
- March 6 (Wed): Presentation of **Group Projects** on Social Activity, Affect, & Nutrition
- March 11 (Mon): **Midterm #3**, beginning of class; Module 9
- March 13 (Wed): Module 9
- March 15 (Friday): Completed PAPER DUE (successfully uploaded to CANVAS), 6:00pm
- March 22 (Friday): **Final Exam**, 1:00-3:00pm