

NROD67

Psychobiology of Aging
Tentative Syllabus 2019

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Lecture: Tues 11-1 pm in MW 130

Office Hours: Wed 11-1

Fascinating psychological and biological questions cluster around the phenomenon of development and aging. Indeed, various lines of research are helping us to understand the aging process.

In this seminar course we will explore the neurobiological changes that occur during the process of aging and the relationship between these neurobiological changes and the cognitive changes that are experienced in the aged. We will examine both normal age-related changes and the cognitive changes that occur in age related disease states. Some of the questions we will discuss in this course include the following. Does every species age in the same way as the human? Is there a fundamental process of “aging” common to all organisms? How does the aging process deviate from the “normal” to cause aging-related disorders in long-lived species? Can one prevent and/or modify the aging process? What roles do nature and nurture play in this process? Can we learn something from various human lifestyles, diets, cultures, environments and even from other species in order to enhance healthy aging? Indeed, the quest to maintain a healthy, long life by mankind has been going on from time immemorial. Past and current research has focused on beginning to answer some of these questions. As we progress through this course we will observe that advances in aging research are contributed by worldwide researchers who cut across many disciplines.

Text: There is no text book for this course. Instead you will read various journal articles on topics related to aging.

Learning Outcomes

By the end of the course you will:

1. Increase your confidence in oral scientific communication of course content in weekly classes.
2. Develop and write a research proposal on a chosen topic related to sleep and aging.
3. Assess current topics through in-class discussion and written assignments.
4. Demonstrate your ability to communicate effectively your research proposal
5. Critique research proposals on a topic you are familiar with.

Grading Scheme:

- 25% Leading In-Class Readings and Presentation
- 25% Class Participation, Discussion Board Postings, Pop Up Quizzes
- 3% Research Goals/Purpose
- 7% Proposal Outline
- 20% Evaluating Research Proposals (2 per person valued at 10% each)
- 5% Video clip
- 15% Final Research Proposal

Leading In-Class Assigned Reading and Presentations

Articles for the week are posted through the library for our course. Each week a group of students will be responsible for presenting the articles to the class and facilitating discussion of these articles. Each group should work together to come up with a good way to highlight the important issues discussed in the articles and to engage the rest of the class in a thoughtful and critical discussion of those issues. You will be graded on your ability to summarize/highlight the important issues in the articles, your presentation skills, your understanding of the readings, and your ability to lead and engage your peers in a group discussion. Your grade will be based on the group performance and your individual contributions. Each group is required to submit a near complete ppt of their presentation to me no later than noon Monday for the next day class. Remember, students are expected to have read these readings in preparation for the class. You do not need to present on all of the information contained within the articles. You should discuss other empirical papers on your topic that complement the readings and our understanding of research in the field.

Participation:

You are expected to read assigned papers before each class, attend regularly, be on time, and be engaged in our class discussion. All course readings can be obtained through the library course reserves tab in Quercus. In addition, students will be required to submit a weekly thought question/idea/issue based on the assigned readings to our Quercus discussion board. This question/idea/issue must be posted no later than noon of the Mon prior to our Tues lecture. You are not required to post an answer to the discussion board posting but may be called upon during the class to provide your answer.

Research Proposal:

There are several components of your research proposal that will be graded and these are described below. You may choose to work with a partner on your research proposal and you will each receive the same final grade for this submission. Please note, while you may work with a partner on the hypothesis, outline and final paper, all students must

evaluate the proposals assigned to them independently. All proposals will address an aspect of sleep and aging. We will discuss the range of topics in class in depth.

Research Goals/Purpose

The hypothesis/purpose (ie the proposed explanation for the phenomenon you are investigating) is not valued at a high proportion of your final grade but is due early in the term to ensure you are working towards the final product well in advance of the deadline. This should be clearly and concisely written and submitted to me electronically by the due date. Please mark your name or names in the subject line.

Proposal Outline

You should bring a hard copy of your proposal outline to your individual meeting. Dates and times for these meetings will be assigned during class but will be scheduled outside of our seminar period. You are expected to demonstrate that you have examined the literature, have list of references to support the research done to date (you are not expected to have your final list of references) and an idea of how you will conduct this research.

The purpose of the proposal outline is to ensure that you have

- done sufficient preliminary reading/research in the area of your interest
- thought about the issues involved and are able to provide more than a broad description of the topic which you are planning to research.

Research Proposal:

The challenge in this assignment is to convince members of the scientific community and our class that you

- have identified a scientific problem
- have reviewed the theoretical background
- have a methodical approach to solve the problem
- have a realistic time frame and reasonable costs associated with the project.

The following sections should be included in this paper:

Project title

Summary statement of the research project:

This one paragraph summary should focus on the research topic, its new, current and relevant aspects. While this will appear at the start of your proposal, you should write this section last.

Review of research literature

A short and precise overview about the current state of research that is immediately connected with your research project.

- Reference the most important contributions of other scientists.
- Discuss the theoretical scope or the framework of ideas that will be used to back the research.
- State clearly how your research will contribute to the existing research.

Objective of the research project

Give a concise and clear outline of the academic (you may also include non-academic, e.g. social) objectives that you want to achieve through your project. Be clear as to why the intended research is important.

Outline the project

This is the central part of your research outline.

- Detail your research procedure.
- Provide a timetable you will follow.
- Describe the intended methods of data gathering, include the controls you will include, the statistical methods to be used
- You are not expected to provide a budget

References

List all articles mentioned in your research

There will be no results or discussion section for this assignment

You are encouraged to be as concise as possible in this final proposal while adequately covering the topic. This proposal should be a maximum of 10 pages, double spaced and can be printed double sided. Late papers will be accepted but docked 10% per day. This proposal is due at the start of class on March 12, 2019. You will each bring 2 printed copies of the proposal to the start of class. These copies of your paper will be peer reviewed and the author will receive the comments prior to the submission of the final proposal to me for evaluation through TURNITIN.

Evaluating Research Proposals

You will evaluate class research proposals and provide constructive feedback and suggestions to the author. You should expect to review 2 proposals for your peers. Only I will evaluate your feedback but the author will receive your comments. On Mar 19, you should return 2 copies of each proposal evaluated. These evaluations should be a maximum of 2 pages. Only 1 copy should have your name on it. Please attach the original research proposal you were assigned to evaluate to the copy with your name on it.

Video Clip

You will prepare a short video clip highlighting your proposal, its importance and why you believe this work should be further investigated and “funded”. The video clip should not be longer than 5 minutes and may be captured on your cell phone or other video capturing device. The file should be submitted to me by email with your name and Video Clip in the subject line. The due date is Mar 5.

Final Proposal Submission

Your final proposal which will be evaluated by me is due Mar 26, 2019 at the start of class. This proposal should be submitted to TURNITIN electronically through Quercus. TURNITIN will time stamp your submissions so please do not submit late. A printed version should be brought to class. This copy should be double spaced but can be printed double sided.

First, some background information on this program. Turnitin.com is a tool that assists in detecting textual similarities between compared works i.e.: it is an electronic resource that assists in the detection and deterrence of plagiarism. The terms that apply to the University's use of the Turnitin.com service are described on the Turnitin.com web site.

“Normally, students will be required to submit their course essays to Turnitin.com for a review of textual similarity and detection of possible plagiarism. In doing so, students will allow their essays to be included as source documents in the Turnitin.com reference database, where they will be used solely for the purpose of detecting plagiarism. The terms that apply to the University's use of the Turnitin.com service are described on the Turnitin.com web site”

Missed Term Work due to Medical Illness or Other Emergency:

All students citing a documented reason for missed term work must submit their request for accommodations **within three (3) business days** of the deadline for the missed work.

Students must submit **BOTH** of the following:

- (1.) A completed **Request for Missed Term Work Accommodations form** (<http://uoft.me/PSY-MTW>), and
- (2.) **Appropriate documentation** to verify your illness or emergency, as described below.

Appropriate documentation:

For missed **TERM TESTS** due to **ILLNESS**:

- Submit the Request for Missed Term Work Accommodations form (<http://uoft.me/PSY-MTW>), along with an **original** copy of the official UTSC Verification of Illness Form (uoft.me/UTSC-Verification-Of-Illness-Form) or an **original** copy of the record of visitation to a hospital emergency room. Forms are to be completed in full, clearly indicating the start date, anticipated end date,

and severity of illness. The physician's registration number and business stamp are required.

For missed **ASSIGNMENTS** due to **ILLNESS**:

- Submit the Request for Missed Term Work Accommodations form (<http://uoft.me/PSY-MTW>), along with a **hardcopy** of the Self-Declaration of Student Illness Form (uoft.me/PSY-self-declare-form).

For missed term tests or assignments in **OTHER CIRCUMSTANCES**:

Submit the Request for Missed Term Work Accommodations form (<http://uoft.me/PSY-MTW>), along with:

- In the case of a **death of a family member or friend**, please provide a copy of a death certificate.
- In the case of a **disability-related concern**, if your desired accommodation is within the scope of your Accommodation Letter, please attach a copy of your letter. If your desired accommodation is outside the scope of your Accommodation Letter (ex. if your letter says "extensions of up to 7 days" but you need more time than that) you will need to meet with your consultant at AccessAbility Services and have them email Keely Hicks (keely.hicks@utoronto.ca) detailing the accommodations required.
- For U of T Varsity **athletic commitments**, an email from your coach or varsity administrator should be sent directly to Keely Hicks (keely.hicks@utoronto.ca) **well in advance** of the missed work, detailing the dates and nature of the commitment.
- For **religious accommodations**, please email (keely.hicks@utoronto.ca) **well in advance** of the missed work.

Documents covering the following situations are NOT acceptable: medical prescriptions, personal travel, weddings/personal/work commitments.

Procedure:

Submit your (1.) [request form](#) and (2.) [medical/self-declaration](#)/other documents in person **WITHIN 3 BUSINESS DAYS** of the missed term test or assignment.

Submit to: Keely Hicks, Room SW420B, Monday – Friday, 9 AM – 4 PM

Exceptions to the documentation deadline will only be made under exceptional circumstances. If you are unable to meet this deadline, you must email Keely Hicks (keely.hicks@utoronto.ca) **within the three business day window** to explain when you will be able to bring your documents in person. Attach scans of your documentation.

Within approximately one week, you will receive an email response from your instructor detailing the accommodations to be made (if any). **You are responsible for checking your official U of T email and Quercus course announcements daily, as accommodations may be time-critical.**

Completion of this form does NOT guarantee that accommodations will be made. The course instructor reserves the right to decide what accommodations (if any) will be made. Failure to adhere to any aspect of this policy may result in a denial of your request for accommodation.

Instructors cannot accept term work after April 12, 2019. Beyond this date, you would need to file a petition with the Registrar's Office to have your term work accepted (<https://www.utoronto.ca/registrar/term-work>).

Note that this policy applies only to missed assignments and term tests. Missed final exams are handled by the Registrar's Office (<http://www.utoronto.ca/registrar/missing-examination>).

Failure to adhere to any aspect of this policy may result in a denial of your request for accommodation.

Tentative Course Schedule

DATE	TOPIC	READINGS
Jan 8	Course Introduction	
Jan 15	Neurobiology of Healthy Aging	Geldmacher 2012 Imhof 2007 Boyle 2013
Jan 22	Models of Aging	Youssef 2016 Engle 2012 Alexander 2012 Roberson 2012 Bizon 2012
Jan 29	Cognitive Training and Enhancers	Davis 2017 Punzi 2017 Jiang 2016
Feb 5	Lifestyle Enrichment and Education Research goal/s due	Yaffe 2014 Scharaga 2015 Santos 2015 Festini 2016 Sternberg 2013
Feb 12	No class, work on proposal	
Feb 19	Reading Week	
Feb 26	Vascular Cognitive Impairments and Stress Proposal outlines due Individual Meetings To Discuss Proposal Outlines Scheduled	Jellinger 2013 Kapasi 2016 De la Torre 2004
Mar 5	Anatomy and Brain Structure Video clips Due	Ousman 2018 Jin 2018 Boyle 2013
Mar 12	AD and MCI	Tampi 2015

	Proposal Due	Invitto 2018 Castanho 2014 Tampellini 2015 Marchionni 2013
Mar 19	Nutrition Proposal Evaluations Due	Swaminathanand 2014 Gopinath 2016 Granzotto 2014 Kent 2014 Hsu 2014
Mar 26	Exercise Final Proposal Due	Bherer 2013 Chapman 2013 Petersen 2018 McGregor 2013 Pons van Dijk, 2013 Wei 2014
April 5	In Class Presentations and Course Wrap up	

Readings:

Alexander GE, Ryan L, Bowers D, Foster TC, Bizon JL, Gelmacher DS & Glisky EL. (2012). Characterizing cognitive aging in humans with links to animal models. *Frontiers in Aging Neuroscience*. doi: 10.3389/fnagi.2012.00021

Bherer L, Erickson KI & Liu-Ambrose T. (2013). A review of the effects of physical activity and exercise on cognitive and brain functions in older adults. *Journal of Aging Research*, Vol 2013, doi.org/10.1155/2013/657508

Bizon JL, Foster TC, Alexander, GE & GLisky . (2012). Characterizing cognitive aging of working memory and executive function in animal models. doi: 10.3389/fnagi.2012.00019

Boyle PA, et al. (2013). Relation of neuropathology with cognitive decline among older persons without dementia. doi: 10.3389/fnagi.2013.00050

Castanho TC, et al. (2014). Telephone based screening tools for mild cognitive impairment and dementia imaging studies: a review of validated instruments. *Frontiers in Aging Neuroscience* doi: 10.3389/fnagi.2014.00016

Chapman SB. et al. (2013). Shorter term aerobic exercise improves brain, cognition, and cardiovascular fitness in aging. *Frontiers in Aging Neuroscience*. doi: 10.3389/fnagi.2013.00075.

Davis, N. (2017). Brain stimulation for cognitive enhancement in the older person: State of the art and future directions. *J Cogn Enhanc* 1:337–344 DOI 10.1007/s41465-017-0036-1

De la Torre JC (2004), Is Alzheimer's disease a neurodegenerative or a vascular disorder? Data, dogma, and dialectics. *Lancet Neurol.* 3(3): 184-190.

Engle JR & Barnes CA. (2012). Characterizing cognitive aging of associative memory in animal models. *Frontiers in Aging Neuroscience.*
doi: 10.3389/fnagi.2012.00010

Festini SB. (2016). The busier the better: Greater busyness is associated with better cognition . *Frontiers in Aging Neuroscience.* doi: 10.3389/fnagi.2016.00098

Geldmacher DS, Levin BE & Wright CB. (2012). Characterizing healthy samples for studies of human cognitive aging. *Frontiers in Neuroscience*
doi: 10.3389/fnagi.2012.00023

Gopinath et al. (2016). Association between carbohydrate nutrition and successful aging over 10 years. *J Gerontol A Biol Sci Med Sci*, 2016, Vol. 71, No. 10, 1335–1340. doi:10.1093/gerona/glw091

Granzotto A & Zatto P. (2014). Resveratrol and Alzheimer's disease: message in a bottle on red wine and cognition. *Frontiers in Aging Neuroscience.*
doi:10.3389/fnagi.2014.00095

Huhn S, Masouleh SK, Stumvoll M., Villringer A & Witte V. (2015). Components of a Mediterranean diet and their impact on cognitive functions in aging. *Frontiers in Aging Neuroscience.* doi: 10.3389/fnagi.2015.00132

Hsu TM & Kanoski SE. (2014). Blood-brain barrier disruption: mechanistic links between Western diet consumption and dementia. *Frontiers in Aging Neuroscience.* doi: 10.3389/fnagi.2014.00088

Imhof A et al. (2007). Morphological substrates of cognitive decline in nonagenarians and centenarians: a new paradigm? *J Neuroscience.* 257(1-2): 72-79.

Invitto S. et al. (2018). Potential role of OERP as early marker of mild cognitive impairment. *Frontiers in Aging Neuroscience.* doi: 10.3389/fnagi.2018.00272

Jellinger KA. (2013). Pathology and pathogenesis of vascular cognitive impairment—a critical update. doi: 10.3389/fnagi.2013.00017

Jiang L et al. (2016) Cortical thickness changes correlate with cognition changes after cognitive training: Evidence from a chinese community study. *Frontiers in Aging Neuroscience* doi: 10.3389/fnagi.2016.00118

Jin K. (2018). Relationship between sulcal characteristics and brain ageing. *Front. Aging Neurosci.* doi: 10.3389/fnagi.2018.00339

Kapasi A. et al. (2016). Watershed microinfarct pathology and cognition in older persons. <https://doi.org/10.1016/j.neurobiolaging.2018.05.027>

Kent B. (2014). Synchronizing an aging brain: can entraining circadian clocks by food slow Alzheimer's disease? *Frontiers in Aging Neuroscience.* doi: 10.3389/fnagi.2014.00234

Marchionni M et al. (2013). Inherited real risk of Alzheimer's disease: bedside diagnosis and primary prevention. doi: 10.3389/fnagi.2013.00013

McGregor KM, et al. (2013). Effects of aerobic fitness on aging-related changes of interhemispheric inhibition and motor performance. doi: 10.3389/fnagi.2013.00066

Ousman S .and Palmer AL (2018). Astrocytes and Aging. *Front. Aging Neurosci.* doi: 10.3389/fnagi.2018.00337

Petersen CB. et al. (2018). Physical activity and the development of visible age-related signs in the general population: a prospective cohort study. *Healthy Aging Research.* <http://dx.doi.org/10.1097/HXR.0000000000000013>

Pons van Dijk, et al. (2013). Taekwondo training improves balance in volunteers over 40. *Frontiers in Aging Neuroscience* doi: 10.3389/fnagi.2013.00010

Punzi e t al. (2017). Modafinil-induced changes in functional connectivity in the cortex and cerebellum of healthy elderly subjects. *Frontiers in Aging Neuroscience.* doi: 10.3389/fnagi.2017.00085

Roberson, et al. (2012). Challenges and opportunities for characterizing cognitive aging across species. *Frontiers of Neuroscience Aging.* doi: 10.3389/fnagi.2012.00006

Santos NC, et al. (2014). Clinical, physical and lifestyle variables and relationship with cognition and mood in aging: across-sectional analysis of distinct educational groups. *Frontiers in Aging Neuroscience* doi: 10.3389/fnagi.2014.00021

Scharaga R, Holtzer R. (2015). Preliminary findings of the Brief Everyday Activities Measurement (BEAM) in older adults. *The Journal of Nutrition Health and Aging* 19:929-934

Swaminathan A. and Gregory AJ. (2014). Nutrition and prevention of Alzheimer's dementia. *Frontiers in Aging Neuroscience.* doi: 10.3389/fnagi.2014.00282

Sternberg DA, et al. (2013). The largest human cognitive performance dataset reveals

insights into the effects of lifestyle factors and aging. *Frontiers in Human Neuroscience*
doi: 10.3389/fnhum.2013.00292

Tampellini D. (2015). Synaptic activity and Alzheimer's disease: a critical update.
Frontiers in Neuroscience doi.org/10.3389/fnins.2015.00423

Tampi RR, et al. (2015). Mild cognitive impairment: A comprehensive review. *Healthy Aging Research* 4:39

Wei G. et al. (2014). Tai Chi Chuan optimizes the functional organization of the intrinsic human brain architecture in older adults. *Frontiers in Aging Neuroscience*. doi: 10.3389/fnagi.2014.00074

Yaffe K. et al. (2014). Lifestyle and health-related risk factors and risk of cognitive aging among older veterans. *Alzheimer's & Dementia* 10 S111-S121

Youssef SA, Capucchio MT, Rofina JE, Chambers JK, Uchida K, Nakayama H and Head E. (2016). Pathology of the Aging Brain in Domestic and Laboratory Animals, and Animal Models of Human Neurodegenerative Diseases. *Veterinary Pathology* Vol. 53(2) 327-348 DOI: 10.1177/0300985815623997