Biology of Aging, NUTR 0247, CMDB 0247
Spring 2021

Who will be leading this course?

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What previous coursework should you have taken?
To succeed in this course, you should have taken Graduate Biochemistry (BCHM-0223) or received permission from one of us. In addition, we recommend that you have taken undergraduate-level classes in Cellular or Molecular Biology and Genetics.

When and where will we meet?
We will meet once a week for 3 hours on Fridays, 9AM-12PM EST
When feasible and safe, we will meet in Jaharis 118. For those who are studying remotely, you will be able to attend classes on Zoom.

What will be discussed in this course?
This course is an in-depth examination of current topics in aging research, with a focus on human aging. Topics to be discussed include theories of aging; physiological, cellular, and epigenetic changes that occur with aging; biochemical and energetic processes that affect healthspan and lifespan; and interventions that may affect the aging process. Approximately 20% of the course material will be lecture-based, while 80% will involve students presenting and critiquing papers selected from a curated list of current aging research literature.

What are your learning objectives for the course?

At the conclusion of the course, you should be able to:
1. Describe and compare various theories of aging.
2. Explain how various cellular machineries and genetic programs function to maintain healthspan and analyze how their breakdown can promote aging, including compromises to neurological, cognitive, vision, and immune function.
3. Examine how nutrition, genetics, and the environment interface with the functions of protective machineries.
4. Evaluate empirical evidence related to new dietary and pharmaceutical approaches to prolong healthspan and lifespan.
5. Analyze opportunities for interventions to prolong healthspan and lifespan.
6. Discuss the experimental and conceptual strengths and weaknesses of papers from the primary aging literature.

What texts and materials will you need for the course?
There is no required text for this course. All necessary lecture slides and readings will be posted on the course Canvas site.

How will your performance be assessed?

You will be assessed based on: (1) your ability to present research papers to the class; (2) your ability to critique these papers in the context of course material; and (3) your participation in the class discussions. Your final grade will be determined by your performance in each of the following three roles. Because we expect that you will gain fluency in the field with each presentation, we will take improvement into account when determining the final grades.

I. **Selecting and presenting a research paper** (at least 1 time during the semester) 30% of total grade

- Rationale for selection of paper
- Preparation for class presentation (including meeting with one of us)
- Clarity and completeness of background information
- Summary of importance of the paper in the field of aging research
- Identification and presentation of important figures in the paper

II. **Serving as a discussant** (at least 2 times during the semester) 40% of total grade

- Preparation for discussion (including meeting with one of us)
- Evaluation of the methods, results, and authors' conclusions
- Identification of controversial issues in the paper
- Suggestion of new experiments/methodology to extend the research
- Ability to engage other students in the discussion

III. **Attendance and participation in discussions** (throughout the semester) 30% of total grade

- Attending all classes and arriving on-time, barring exceptional unforeseen circumstances (please inform us if you know you will miss a class ahead of time)
- Evidence that you have come to class having read the paper
- Contributing to class discussions and participating in small group activities
- Actively listening to others and showing respect to your colleagues if your interpretations of the papers differ from theirs

Detailed instructions for the research paper presentations and critiques will be provided at the beginning of the semester.

A passing grade in the course is 'B-'or better. Course grades will be based on the scale below (subject to revision during the course).

A	> 93%	C	70-80%
A-	90 - 93%	D	60-70%
B+	87 - 90%	F	<60%
B	83 - 87%		
B-	80 - 83%		

What are the penalties for late or incomplete assignments?
We will work with you to ensure that they can attend class when presenting research papers or serving as discussants. Excessive unexcused absences will negatively impact the participation part of your grade.

Because everyone will have an opportunity to present a paper or act as a discussant within the first month of the class, we will be able to make adjustments early in the semester if you are having trouble.

Important University Policies:

- ***Sexual Misconduct Policy:*** Tufts is committed to providing an education and work environment that is free from sexual misconduct. If you or someone you know has been harassed or assaulted, please contact Dan Volchok, the GSBS Sexual Misconduct Reporting Liaison, at 6-6767 or daniel.volchok@tufts.edu. He can help you find appropriate resources and discuss your options. Anonymous reporting is available through the Tufts anonymous Incident Report Form: (https://tuftsuniversity.ethicspointvp.com/custom/tuftsuniversity/oeo/form_data.asp). Students may also obtain free confidential counseling through Talk One2One at 1-800-756-3124. Campus police may be contacted at 6-6911.

- ***Americans with Disabilities Act Policy:*** Tufts University is committed to providing reasonable accommodations for qualified individuals with disabilities. If you are interested in seeking accommodations in courses or in a laboratory setting, please contact Dan Volchok, the GSBS Disability Officer, at 6-6767 or at daniel.volchok@tufts.edu.

- ***Tufts Information Stewardship Policy*** outlines the actions all members of the Tufts community are expected to follow when working with institutional data and systems (https://it.tufts.edu/ispol).

- ***Academic Conduct:*** All students are responsible for compliance with all academic standards and policies, including plagiarism and academic integrity, as outlined in the Graduate School of Biomedical Sciences Student Handbook (https://gsbs.tufts.edu/studentLife/StudentHandbook).

Tentative Course and Assignment Schedule:

DATE	TOPIC	ASSIGNMENTS & ACTIVITIES	LEAD INSTRUCTOR
1-22	Introduction to theories of aging	Introductory readings	McVey
1-29	Molecular signatures of aging and longevity	Readings/paper discussion	McVey
2-5	Studying aging in model organisms	Readings/paper discussion	McVey
2-12	The mTOR pathway and rapamycin	Readings/paper discussion	McVey/Taylor
2-19	Redox regulation of aging, mitochondria, and antioxidants	Readings/paper discussion	Taylor
2-26	Environment and nutrition effects on aging, caloric and nutrient restriction	Readings/paper discussion	Taylor/McVey
3-5	Ubiquitin and autophagic proteolytic pathways and aging	Readings/paper discussion	Taylor
3-12	Diseases of old age and protein quality control: diabetes, cardiovascular disease, eye diseases, cancer, glyoxalase	Readings/paper discussion	Taylor
3-26	Proteotoxicity and diseases of protein aggregation	Readings/paper discussion	Taylor
4-2	Proteotoxicity and neurodegenerative aging Parkinson's and Alzheimer's diseases	Readings/paper discussion	Taylor
4-9	Inflammation and changes in the immune system during aging	Readings/paper discussion	Wortis
4-16	Recent advances in anti-aging interventions: senolytics and epigenetic reprogramming	Readings/paper discussion	McVey
4-23	Team summaries I: wrap-up and discussion of new directions in aging studies	Group presentations	Taylor/McVey
4-30	Team summaries II: wrap-up and discussion of new directions in aging studies	Group presentations	Taylor/McVey

This schedule is subject to modifications at the discretion of the course directors.