

KINGSBOROUGH COMMUNITY COLLEGE
CITY UNIVERSITY OF NEW YORK
DEPARTMENT OF BIOLOGICAL SCIENCES
THE BIOLOGY OF AGING
BIO 3900

Instructor: A. Rohan e-mail: arohan3@schools.nyc.gov

COURSE SYLLABUS

COURSE DESCRIPTION: BIO 3900 – THE BIOLOGY OF AGING 3 credits 3 hours

Biological aspects of the aging process, including: definitions, characteristics and biological theories of aging, recent biological research, effects of disease and prescription drugs; determination of each student's aging profile, factors which modify the rate of the aging process, including nutrition and exercise. This course does not satisfy the Biology major elective requirement.

Flexible Core: Scientific World (Group E)

Pre/Co-Requisites: Enrolled in College Now

STUDENT LEARNING OUTCOMES

Upon completion of the course student should be able to:

1. Explain the biological mechanisms of aging and communicate these mechanisms clearly.
2. Evaluate competing scientific theories of aging and produce evidence-based arguments supporting or critiquing each.
3. Interpret primary scientific literature on aging by analyzing research design, data, and conclusions, and present findings in structured written critiques.
4. Communicate and defend evidence-based conclusions on aging-related issues through oral presentations and structured debates using scientific reasoning and scholarly sources.
5. Apply quantitative reasoning skills to interpret data sets related to life expectancy, mortality rates, or experimental outcomes in gerontology, and use this analysis to construct data-driven arguments.
6. Synthesize biological and interdisciplinary perspectives to evaluate how aging research informs societal, ethical, or public policy decisions.
7. Investigate an aging-related question, providing evidence-based conclusions in both written and oral formats.
8. Demonstrate the ability to communicate complex scientific concepts about aging to both scientific and lay audiences, adjusting argumentation style and evidence appropriately to each context.

TEXTBOOK *(will be provided)*

The Clock of Ages (1996) by John J. Medina.

Cambridge University Press, United Kingdom

GRADES

Examinations 40%

Classwork 10%

Journal Report 10%

Advertisement Report 10%

Movie Report 10%

Final Examination 20%

COURSE OUTLINE

Part 1:

Weeks 1-5

Week 1: An Introduction to Aging

Weeks 1-2: What is the Process of Aging

Weeks 3-4: Death of Cells, Individuals and Populations

Week 5: Aging in Alternative Narratives

Narratives report is due week 6

Examination #1 occurs week 4

Textbook Reading

pp. 1-70

Part 2:

Weeks 6-9

Week 6: Biomarkers of Aging

Week 7-8: Effects of Aging on Tissues, Integumentary and Skeletal Systems

Week 9: Effects of Aging on Nervous and Cardiovascular Systems

Week 10: Effects of Aging on Digestive and Urinary Systems

Examination #2 occurs week 10

Journal report is due week 11

pp. 71-224

Part 3:

Weeks 8-12

Week 11: DNA structure, Genes, and Protein Synthesis

Week 12: The Cellular Senescence Hypothesis of Aging

Week 13: The Wear and Tear Hypothesis of Aging

Advertisement report is due week 14

Week 14: What Can We Do to Slow Down Aging?

Week 15: Presentations

pp. 225-316

STUDENT OBJECTIVES

Part 1: Who Ages?

- Define aging and the appearance of it: Primary aging, secondary aging, and gerontology
- Discuss lifespan and how environmental factors can affect it
- Distinguish between the different types of aging: physical, mental, emotional, rapid, gradual, negligible, and the characteristics of it
- Examine the theories of aging: organ based, physiological, genomic hypothesis
- Discuss the Hallmarks of Aging: genomic instability, telomere attrition, epigenetic alterations, loss of proteostasis, deregulated nutrient sensing, mitochondrial dysfunction, cellular senescence, stem cell exhaustion and altered intercellular communication
- Define Apoptosis and the death of cells
- Define longevity and use specific blue zone locations to demonstrate it how factors can affect longevity
- Define different stresses that can cause aging in the cells.
- Study and examine different forms of media and how aging is depicted in each

Part 2: How Do We Age?

- How does aging affect the cardiovascular system: thickening of vessels, aging of the heart, repairing structures in the system
- How does aging affect the musculoskeletal system: dystrophy of muscles, weakening of bones,

diseases of the joints, slowing of blood cell creation

- How does aging affect the digestive system: loss of muscle tone within the digestive tubes, lack of enzyme creation, weakening of the stomach and its juices
- Aging of the brain: diseases that affect the brain, neurological pathways diminishing, memory loss, neuromuscular connections slow.
- Aging of the lungs: loss of ability to breathe as much oxygen, loss of elasticity of the lungs, diseases that manifest into lungs through lifestyle choices.
- Aging of the reproductive system: reproductive maturing, menopause, scientific advancements to subvert aging

Part 3: Why Do We Age?

- Examine winding back the clock and what that means for aging
- Discuss the wear and tear of aging
- Senescence of aging
- What can be done to slow or reverse aging: botox, stem cells, cellulose, blood therapies, replacing organs, cosmetic enhancements, plastic surgery

Civility Statement

As an institution of higher education, Kingsborough Community College and its faculty and staff are committed to its entire student body. As such, we strive to interact with each student equitably and professionally while providing an environment of mutual respect and civility. In the event a student has an allegation charge brought against him/her that is a breach of the Henderson Rules to Maintain Public Order or the Campus Code of Conduct, an immediate investigation will commence followed by a conciliation conference to determine the appropriate outcome within a thirty day period. The Judicial Affairs process at Kingsborough Community College is critical in providing an agenda for safety, yet simultaneously offering protection of the rights of students who may have been accused of being in violation of the Henderson Rules to Maintain Public Order and/or the Campus Code of Conduct. These rights have been afforded to each Kingsborough student under the bylaws that were established in 1969.

Academic Integrity Policy

Academic integrity means that all the work you do in this course (exams, quizzes, reports, papers, etc.) is your OWN work and no one else's. It includes not cheating on exams or quizzes in any way, as well as avoiding plagiarism in your writing. Plagiarism is using anyone else's work or ideas without proper attribution. This means that if you quote, paraphrase, or even describe in your own words, an idea that comes from someone else's writing, you MUST acknowledge that author in parentheses at the end of the sentence or sentences in which you have summarized his or her idea. Plagiarism, whether intentional or not, is taken seriously and can result in a failing grade. This includes utilization of A.I. processes to compose your assignments. It is almost always very obvious if you do it, so don't risk it. If you are not sure how to reference a source, ask the instructor for help. Your instructor adheres to CUNY policy on academic integrity, which can be found in your student handbook or online at http://www.kingsborough.edu/Academic_Integrity_Policy.pdf. These sources explain the policy in detail and give examples. Please be aware that academic dishonesty may result in a failing grade on the exam or in the course, as well as dismissal from the college. Additional websites that may be of use include: turnitin.com, citationmachine.com and plagiarism.org. (Polizzotto, K., personal communication, 2008).

Attendance Policies

Attendance will be taken at the start of class. Any student not present when attendance is taken will be marked *absent*. If a student arrives late to class, it is the responsibility of the student to inform the instructor at the end of class that he/she came in late. At that point, the *absence* will be changed to *late*. You are allowed 4 unexcused absences. If the student exceeds that number they may be dropped from the class. Assignments submitted late receive partial credit.

Accessibility

Access-Ability Services (Students with Disabilities) Room D-205, Ext. 5175

Access-Ability Services (AAS) is committed to opening doors of equal opportunity to individuals with disabilities at Kingsborough Community College. The goal of Access-Ability Services (AAS) is to equalize educational opportunities and to provide access through appropriate academic accommodations. AAS serves as a liaison and resource to the Kingsborough College community regarding disability issues, promotes equal access to all Kingsborough Community College programs and activities, and makes every reasonable effort to provide appropriate accommodations and assistance to students with disabilities. Students with disabilities who require accommodations are asked to complete an “Application for Academic Accommodations” and submit supporting documentation. For more info http://www.kbcc.cuny.edu/access_ability/Pages/welcome.aspx

Equity Statement

In an ideal world, science would be objective. However, much of science is subjective and is historically built on a small subset of privileged voices. I acknowledge that much of scientific research and publications have been the work of white men. With that in mind, I have tried to select topics and activities that broaden the voice of science as well as consider and respect differences. However, although I have tried to address inequities in science, there may be both overt and covert biases in the materials you read during the course. Please contact me if you have any suggestions to improve the quality of the course materials. One of my teaching goals is to create a learning environment that supports a diversity of thoughts, perspectives, and experiences, and honors your identities (including race, gender, class, sexuality, religion, ability, etc.). To help accomplish this:

- I will ask you to tell me the name and/or set of pronouns you would like me to use to address you.
- I want to be a resource for you. If you feel like your performance in the class is being impacted by your experiences outside of class, please don't hesitate to connect with me to talk about it.
- Like so many people, I am still in the process of learning about diverse perspectives and identities. I will make mistakes!