

# Bio 219

## **Biological and Social Aspects of Aging**

Number of Credit Hours = 1; Contact hour/week= 1

Enrollment level- Sophomores

### **Course Description:**

From the beginning of time, people have tried to understand aging. Almost every culture has a mythology to explain it. As we grow up, tales of eternal youth pique our curiosity. And, it is these ponderings that may provide just the spark needed to ignite a budding scientist. Since the National Institute on Aging (NIA) was established at the National Institutes of Health (NIH) in 1974, our understanding of the biological basis of aging, and how that biology can be manipulated to improve health and longevity, continues to advance at an accelerating pace. A course on biological and social aspects of aging introduces some key concepts into the biological, social and physiological aspects of aging. One can look at each topic individually, or one can step back to see how they fit together in a lattice-work, interwoven to help us better understand aging processes.

### **Course Objectives:**

By 2030 we will be living in an America with 1 in 5 American 65 years or older. The ethnic minority portion of our population, is growing at an amazing pace from 4.3 million persons in 1990 to 22.5 million expected by the year 2050. This nation needs to be prepared to deal with ethnically diverse minority elderlies who will account for more than 15% of older persons by 2020 and more than 21% of older persons by 2050.

Nationally, efforts are underway to develop a cadre of researchers who will create culturally sensitive health measures to assess the health status of minority elders with greater precision. Advancing Diversity in Aging Research at Howard University (HUADAR) is an NIH funded program with an overall goal to fulfill the objectives of the NIA Health Disparities Strategic Plan which is to identify this cadre of minority scientists early during their undergraduate years, provide them with a foundation of knowledge and research skills through mentoring so these students will excel in the interdisciplinary field of gerontology. Based on this conviction, two courses are proposed on (1) basic biology of aging process and the social aspects of aging, and (2) Aging physiology and age-related disorders.

**Policy Regarding Cheating:** All students are required to read the “Academic Code of Conduct” which is published in the Student Reference Manual and Directory of Classes. Cheating will not be tolerated.

**American Disabilities Act (ADA):** Howard University is committed to providing an educational environment that is accessible to all students. In accordance with this policy, students who need accommodations because of a disability should contact Dr. Barbara Williams, Dean for Special Student Services (202-238-2420), as soon as possible after admission to the University or at the beginning of each semester. If you need a special accommodation required by the American Disabilities Act, please document and discuss your disability with the instructor during the first week of classes.

**Text:** Handbook of the Biology of Aging, 7<sup>th</sup> edition, Edited by Edward Masoro and Steven Austad. Academic Press

**Prerequisites:** Biology 101 and Biology 102

**Instructors:** Drs. Atanu Duttaroy (aduttaroy@howard.edu), Kebreten Manaye (kmanaye@howard.edu), Joanne Allard (joanne.allard@howard.edu), Talitha Washington (talitha.washington@howard.edu), Antonei Csoka (anatonei.csoka@howard.edu), and Elizabeth Bertera (ebertera@howard.edu).

**Week 1: Signs of Aging ----- Dr. Atanu Duttaroy**

1. What is Aging?
2. Symptoms of aging.
3. Rate of aging is different for each organism and what's that telling us?

**Week 2: Human longevity in historical perspective ----- Dr. Antonei Csoka**

1. Life expectancy.
2. Survival Curve.
3. Mean and Maximum Life Span.
4. How to measure aging?

**Week 3: Quantitative approach to aging ----- Dr. Talitha Washington**

1. Define quantitative versus qualitative methods,
2. Measurement and Precision.
3. Interpreting Data: Gathering data, displays of data, summary statistics, and hypothesis testing,
4. Survey of Modeling: Definition, Process, Limitations, Types (Continuous vs. Discrete). Examples may include the Gompertz law of mortality, Lelie models, cellular turnover models, dynamical disease models, aging in tissue, and network models for aging.

**Week 4: Theories of aging I ----- Dr. Kebreten Manaye**

1. Programmed aging vs Wear and tear aging,
2. Species-specific aging,
3. Reproduction and aging,
4. Antagonistic pleiotropy

**Week 5: Theories of Aging II ----- Dr. Antonei Csoka**

1. Cellular senescence hypothesis of aging,
2. Free radical theory of aging.

**Week 6: Genetic control of Aging 1 ----- Dr. Atanu Duttaroy**

1. Searching for Aging Genes. 2. Mutants showing delayed aging in *C. elegans* – Age-1, Daf-2 and Daf-16 genes.

**Week 7: Genetic control of Aging 2 ----- Dr. Atanu Duttaroy**

1. Insulin signaling in Biological aging. 2. Conservation of Insulin Signaling pathway.

**Week 8: Delaying aging by non-genetic means 1 -----Dr. Joanne Allard**

1. Dietary Strategies - Antioxidants, Vitamins and Essential Fatty acids 2. Calorie Restriction and intermittent fasting

**Week 9: Delaying aging by non-genetic means 2 -----Dr. Joanne Allard**

1. Hormone Therapy 2. Physical exercise, 3. Social activity and mental engagement

**Week 10: Social aspects of Aging -----Dr. Elizabeth Bertera**

1. Common stereotypes held about the elderly within our society regarding physical, cognitive and social dimensions. Statistics and information about public perceptions of the elderly will be presented through the use of YouTube videos, 2. Older person's self-concept, behavior, and mental health implications for the health care field.

**Week 11: Health disparities, ethnic diversity in aging -----Dr. Elizabeth Bertera**

1. Definition of Health disparities in terms of the burden of disease, injury, violence, or in opportunities to achieve optimal health experienced by socially disadvantaged racial, ethnic, and other population groups, and communities.

**Week 12: Health disparities, ethnic diversity in aging -----Dr. Elizabeth Bertera**

1. Class exercise: Students will be given specifics on the health status and health behaviors of U.S. adults aged 65 years and older from disadvantaged racial, ethnic, socioeconomic groups. Students will discuss causes and cures for disparities in terms of the role of individuals, communities and health care providers.

**Week 13-15: Student presentations**

**Evaluation and grading:**Reflection papers:

Students are expected to pay sufficient attention to the class. So, they will be asked on several occasions to develop reflective responses. Three reflection papers, each no less than one page long will cover 50% of the grade. These reflection papers are to be used as proof of thoughtful, meaningful, and critical thinking of the subject matter.

Student Presentations: 50% of the grade.