BIO-2100: BIOLOGY OF AGING

Cuyahoga Community College

Catalog Description:
Exploration of current biological theories of aging with emphasis on humans. Fundamental concepts of cell biology and physiology will be used to study extrinsic and intrinsic factors of aging. Topics will include normal age related changes and pathology in body systems, senescence, genetics, life expectancy, and improving longevity.

Credit Hour(s):
3

Lecture Hour(s):
3

Lab Hour(s):
0

Other Hour(s):
0

Requisites
Prerequisite and Corequisite
BIO-1040 The Cell and DNA, or BIO-1050 Human Biology, or BIO-1500 Principles of Biology I, or BIO-2331 Anatomy and Physiology I.

I. ACADEMIC CREDIT

Academic Credit According to the Ohio Department of Higher Education, one (1) semester hour of college credit will be awarded for each lecture hour. Students will be expected to work on out-of-class assignments on a regular basis which, over the length of the course, would normally average two hours of out-of-class study for each hour of formal class activity. For laboratory hours, one (1) credit shall be awarded for a minimum of three laboratory hours in a standard week for which little or no out-of-class study is required since three hours will be in the lab (i.e. Laboratory 03 hours). Whereas, one (1) credit shall be awarded for a minimum of two laboratory hours in a standard week, if supplemented by out-of-class assignments which would normally average one hour of out-of-class study preparing for or following up the laboratory experience (i.e. Laboratory 02 hours). Credit is also awarded for other hours such as directed practice, practicum, cooperative work experience, and field experience. The number of hours required to receive credit is listed under Other Hours on the syllabus. The number of credit hours for lecture, lab and other hours are listed at the beginning of the syllabus. Make sure you can prioritize your time accordingly. Proper planning, prioritization and dedication will enhance your success in this course.

The standard expectation for an online course is that you will spend 3 hours per week for each credit hour.

II. ACCESSIBILITY STATEMENT

If you need any special course adaptations or accommodations because of a documented disability, please notify your instructor within a reasonable length of time, preferably the first week of the term with formal notice of that need (i.e. an official letter from the Student Accessibility Services (SAS) office). Accommodations will not be made retroactively.
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For specific information pertaining to ADA accommodation, please contact your campus SAS office or visit online at http://www.tri-c.edu/accessprograms. Blackboard accessibility information is available at http://access.blackboard.com. Eastern (216) 987-2052 - Voice
Metropolitan (216) 987-4344 – Voice. (216) 987-4048 – TTY.
Western (216) 987-5079 – Voice. (216) 987-5117 – TTY.
Westshore (216) 987-3900 – Voice. (216) 987-4048 – TTY.
Brunswick (216) 987-5079 – Voice. (216) 987-5117 – TTY.
Off-Site (216) 987-5079 - Voice

III. ATTENDANCE TRACKING

Regular class attendance is expected. Tri-C is required by law to verify the enrollment of students who participate in federal Title IV student aid programs and/or who receive educational benefits through other funding sources. Eligibility for federal student financial aid is based in part on enrollment status.

Students who do not attend classes for the entire term are required to withdraw from the course(s). Additionally, students who withdraw from a course or stop attending class without officially withdrawing may be required to return all or a portion of their financial aid based on the date of last attendance. Students who do not attend the full session are responsible for withdrawing from the course(s).

Tri-C is responsible for identifying students who have not attended a course before financial aid funds can be applied to students’ accounts.

Therefore, attendance is recorded in the following ways:

• For in-person and blended-learning courses, students are required to attend the course by the 15th day of the semester (or equivalent for terms shorter than five weeks) to be considered attending. Students who have not met all attendance requirements for in-person and blended courses, as described herein, within the first two weeks or equivalent, will be considered not attending.

• For online courses, students are required to login at least two times per week and submit one assignment per week for the first two weeks of the semester, or equivalent to the 15th day of the term. Students who have not met all attendance requirements for online courses, as described herein, within the first two weeks or equivalent, will be considered not attending.

At the conclusion of the first two weeks of a semester or equivalent, instructors report any registered students who have “Never Attended” a course. Those students will be administratively withdrawn from that course. However, after the time period in the previous paragraphs, if a student stops attending a class or wants or needs to withdraw, for any reason, it is the student’s responsibility to take action to withdraw from the course. Students must complete and submit the appropriate Tri-C form by the established withdrawal deadline.

Tri-C is required to ensure that students receive financial aid only for courses that they attend and complete. Students reported for not attending at least one of their registered courses will have all financial aid funds held until confirmation of attendance in registered courses has been verified. Students who fail to complete at least one course may be required to repay all or a portion of their federal financial aid funds and may be ineligible to receive future federal financial aid awards. Students who withdraw from classes prior to completing more than 60 percent of their enrolled class time may be subject to the required federal refund policy.

If illness or emergency should necessitate a brief absence from class, students should confer with instructors upon their return. Students having problems with coursework due to a prolonged absence should confer with the instructor or a counselor.

IV. LEARNING OUTCOMES ASSESSMENT

Occasionally, in addition to submitting assignments to their instructors for evaluation and a grade, students will also be asked to submit completed assignments, called ‘artifacts,’ for assessment of course and program outcomes and the College’s Essential Learning Outcomes (ELOs). The artifacts will be submitted in Blackboard or a similar technology. The level of mastery of the outcome demonstrated by the artifact DOES NOT affect the student’s grade or academic record in any way. However, some instructors require that students submit their artifact before receiving their final grade. Some artifacts will be randomly selected for assessment, which will help determine improvements and support needed to further student success. If you have any questions, please feel free to speak with your instructor or contact the Learning Outcomes Assessment office.

V. CONCEALED CARRY STATEMENT

College policy prohibits the possession of weapons on college property by students, faculty and staff, unless specifically approved in advance as a job-related requirement (i.e., Tri-C campus police officers) or, in accordance with Ohio law, secured in a parked vehicle in a designated parking area only by an individual in possession of a valid conceal carry permit.

As a Tri-C student, your behavior on campus must comply with the student code of conduct which is available on page 29 within the Tri-C student handbook, available athttp://www.tri-c.edu/student-resources/documents/studenthandbook.pdf. You must also comply with the College’s Zero Tolerance for Violence on College Property available athttp://www.tri-c.edu/policies-and-procedures/documents/3354-1-20-10-zero-tolerance-for-violence-policy.pdf.

Outcomes

Course Outcome(s):

Define the term aging and explain how aging is measured.
Objective(s):
1. Compare definitions of biological aging and the distinction of aging from disease.
2. Describe factors that cause or influence the process of aging.
3. Identify models used to study aging and how aging is measured.
4. Explain how demographic data is used in the study of aging.
5. List and describe different theories of aging.

Course Outcome(s):
Explain the cellular and molecular mechanisms of aging.

Objective(s):
1. Compare and contrast longevity studies in various organisms (yeast, roundworms, fruit flies, mice and humans).
2. Describe the phases of the eukaryotic cell cycle and explain how it is regulated.
3. Describe the characteristics of senescent cells grown in culture.
4. Compare oxidative stress and telomere shortening theories of aging.
5. Describe how genes are expressed through the transcription of DNA and translation of RNA into an amino acid sequence.

Course Outcome(s):
Understand the age related changes in animal physiological systems.

Objective(s):
1. Describe how changes in body composition and energy metabolism affect aging.
2. Identify mechanisms and the resulting changes associated with normal aging and age related pathology in the skin and the nervous, sensory, digestive, urinary, immune, reproductive, cardiovascular, endocrine, and musculoskeletal systems.

Course Outcome(s):
Explain how aging and longevity can be modulated.

Objective(s):
1. Describe how calorie restriction affects life span.
2. Describe how increased function or maintenance of function results from regular physical activity.

Methods of Evaluation:
1. Quizzes
2. Exams
3. Written reports
4. Research papers
5. Projects (individual or group)
6. Presentations (individual or group)
7. Article discussions/reviews/summaries
8. Discussion boards
9. Homework assignments
10. Case studies

Course Content Outline:
1. CONCEPTS
   a. Biogerontology
   b. Longevity
   c. Life span
   d. Development, maturity, and senescence
   e. Homeostasis
   f. Intrinsic rate of aging
   g. Extrinsic rate of aging
   h. Genotype
   i. Phenotype
   j. Epigenome
   k. Cross-sectional vs. longitudinal studies
1. Life expectancy
m. Mortality rate
n. Age dependent and age independent mortality
o. Life table
p. Survival curves
q. Cell cycle
r. Cell cycle regulation
s. Mitosis
t. Replicative senescence
u. Oxidative stress
v. Reactive oxygen species
w. Telomeres
x. Gene expression, including transcription, RNA processing, and translation
y. Levels of gene expression in eukaryotes, including chromatin structure, transcription factors, RNAi, and epigenetics
z. Total energy expenditure
   aa. Resting energy expenditure
   bb. Diet-induced thermogenesis
   cc. Normal age related changes in body systems
dd. Age related disorders by body systems
   ee. Morbidity
2. SKILLS
   a. Interpreting graphs and tables
   b. Evaluating published literature
3. ISSUES
   a. Senescence
   b. Longevity
   c. Health and wellness related to aging

Resources


Resources Other
1. Books:
2. Websites:
a. Alzheimer's Association www.alz.org
b. American Heart Association www.americanheart.org
c. Centers for Disease Control and Prevention www.cdc.gov
d. National Institute on Aging. Website for the federal effort on aging research at the U.S. National Institutes of Health www.nia.nih.gov