BIOL S106 – Genetics, Development, Ecology & Evolution

Course Structure:

- **Part I (106A)**: Taught by Dr. Amaleah Hartman, corresponding with BIOL 103 (fall and spring semesters).
- **Part II (106B)**: Taught by Dr. Thomas Near, corresponding with BIOL 104 (fall and spring semesters).
- Each part counts for 50% of your grade.

General Class Structure:

- **Lectures**: Monday-Friday, 10:30-12:15 EST, June 30th – August 1st, 2025.
- **Location**: TBD, Yale campus.
- **Activities**: Group activities, Q&A sessions, and live presentations.

Course Calendar:

- Available on Canvas once we approach the start date.

Academic Integrity:

- Students must read and understand “Appendix A” of the Yale Summer Session Handbook.
- Violations may result in a zero (0) for the assignment and potentially an "F" for the course at the instructors' discretion.

Late Policies:

- **Homework on Canvas**: 1% deduction per hour late (maximum 50%). Corrupt/blank files are considered late.
- **Class Attendance**: 1 participation point lost per 10 minutes late.
- **Quizzes/Exams**: Same attendance penalty applies; no extra time for late arrivals. No make-up quizzes.

Part I – Genetics and Development – BIOL 106A

Instructor: Dr. Amaleah Hartman (she/her) amaleah.hartman@yale.edu

Office Hours: TBD

Course Description

The goal of this course is to provide students with an introductory overview of developmental biology in selected animal model organisms, as well as genetics from the work of Mendel to our current understanding of the gene at the molecular level. There will be an emphasis on the importance of experimental approaches used to

understand genetics and development in addition to critically considering selected challenges and issues related to these fields of study.

The lectures are designed to be interactive. In addition to instructor presentations, we will often break into small groups to discuss problems and analyze data allowing students to develop critical thinking and problem-solving skills.

Importantly, you will continue to develop your skills of reading and interpreting primary research articles, and how to construct precise and concise scientific writing in an independent research proposal, the culmination of your submitted homework assignments.

Expected Learning Outcomes

1. Understand that genetic information is passed from parent to offspring, and the inherited traits can be predicted
2. Understand that genetic information can change, leading to modified physical or physiological traits, which is the basis for variation, adaptation, and evolution; and can lead to development gone awry, i.e., cancer
3. Predict the outcomes of genetic crosses when parental genotypes or phenotypes are known
4. Critically analyze the advantages and disadvantages of genetic manipulation
5. Appreciate that development of multicellular organisms is progressive, and the fate of cells becomes determined at different times due to differential gene expression
6. Understand that development is studied through selected model organisms and this is possible due to the conservation of similar developmental mechanisms of animals
7. Identify the important function of stem cells in normal development and regeneration as well as their powerful uses and application in the study of disease and drug development
8. Be able to analyze data relating to gene expression, cellular identity, and synthesize hypotheses regarding the regulation of gene expression and
9. Understand tools, techniques, hypotheses and experiments that were used to generate our understanding of some of the key aspects of genetics and development

Methods of Assessment:

- Participation (20%)
- 4 Homework assignments, culminating in a short research proposal (30%)
- 3 Quizzes (50%, lowest dropped)

Part II – Ecology and Evolutionary Biology - BIOL 106B

Instructor: Dr. Thomas Near thomas.near@yale.edu

Office Hours: TBD

Course Description: Introduction to evolutionary biology and ecology, life history patterns, and overarching themes in evolution and ecology.

Expected Learning Outcomes:

1. Understand evidence leading to the discovery of evolution.
2. Explain natural selection and genetic drift.
3. Define species and understand speciation.
4. Infer evolutionary relationships using phylogenetics.
5. Infer optimal phylogenetic trees with comparative data.
6. Understand fossil record interpretations related to life's history.
7. Grasp population growth limits, species interactions, niche concept, and island biogeography.
8. Assess life origin theories.
9. Describe life's broad history (Archaea, Eubacteria, Plants, Fungi, Animals).
10. Understand evolution rates across the tree of life.

Methods of Assessment:

- Six in-class quizzes (50%, lowest dropped)
- Two writing assignments (30%)
- Participation (20%)
- No make-up quizzes.

Prerequisites: None.

Inclusion and Accessibility: BIOL S106 strives to be an inclusive community, providing an enriching learning environment for all. We promote discussion, inquiry, and respect for diverse viewpoints.

Disability Accommodations: Please inform us of any disability-related needs as soon as possible, even if not registered with Student Accessibility Services. We will make every attempt to accommodate your needs.