

BIOS 2610: Integrative Genetics

Syllabus

Fall 2026, MW 9:30 – 10:45 AM

Instructor Information

Instructor

Prof. Yury Chernoff
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Email

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Office Hours

By appointment

General Information

Credit hours - 3

Description

The Integrative Genetics curriculum is an advanced look at genetics. BIOS 2610 lecture must be taken together with the BIOS 2611 lab. Although listed as separate courses, one cannot withdraw only from the lab course and continue taking the lecture course or vice versa. Both courses are intended to integrate and expand a student's knowledge in genetics beyond what is presented in typical undergraduate genetics courses. It is expected that students taking this class already know the fundamental genetic principles, such as Mendel's laws and the role of DNA in inheritance. The course contents is primarily aimed at students having A or B in Biological Principles or equivalent, and overall GPA of 3.0 or above (even though these are not formal requirements), and interested in the in-depth knowledge of genetics.

Integrative Genetics lecture presents a deeper dive into the fundamentals of genetics, integrating classical genetics discovery science with recent studies at molecular level and the applications of genetics. Rules of transmission genetics and their molecular basis are considered in parallel. In addition to a comprehensive coverage of general genetic principles, the course includes in-depth coverage of some topics emphasizing how genetic analysis techniques are used to uncover the rules and mechanisms of inheritance. Instruction includes a combination of traditional lecture, interactive lecture elements, primary literature review, in-class discussions, and Q&As. In addition to readings in the textbook, students will read and discuss articles from the primary scientific literature to practice reading and interpreting this literature and to link textbook and lecture content to real world applications.

Course Mode

In Fall 2026, BIOS 2610 is taught in person, unless any Institute-wide changes of the teaching mode occur during a semester.

Pre- &/or Co-Requisites

Required: BIOS 1107 with Lab, or BIOL 1510/1511, or equivalent; Co-Requisite: BIOS 2611

Course Goals and Learning Outcomes

By the end of this class, students will be able to:

- (1) understand the fundamental principles of inheritance ranging from molecules to populations and how they apply to various groups of living organisms;
- (2) explain the molecular mechanisms underlying the transmission of genetic traits;
- (3) explain the molecular mechanisms underlying the transition from genes to phenotypes;
- (4) apply genetic concepts to analysis of modern scientific literature;
- (5) understand the genetic basis of human evolution and disease;
- (6) explain how fundamental properties of DNA, RNA, and proteins are exploited in biotechnology, genetic engineering and genetic health testing.

Course Requirements & Grading

Graded Components

Quizzes, Homeworks and In-class Activities – 40%

Exams – 60%

Extra credit could be assigned for exceptional performance in the class and active participation in the in-class activities.

Description of Graded Components

Homeworks and Quizzes: Will be posted on Canvas or given in class (on paper). In each case, the Professor will provide details on how to return the completed assignment. Some quizzes could be given in class without a prior notice. Lowest scores on homeworks and/or quizzes (depending on the number of assignments taken) will be dropped.

In-class Activities: This class will require your active participation in discussions and in class assignments. The class will alternate between regular and interactive lectures; interactive lectures will include graded questions to the students. These are designed to increase your comprehension and capacity to speak intelligibly about important topics in genetics. Attendance polls will be taken periodically and will contribute to in-class score.

Exams: Cover lecture materials, include questions of various types. Taken during assigned class periods or assigned final exam period with strict time control. Two in-class exams and one final exam are expected. Limited use of supportive materials (typically one page of supporting information) will be allowed.

Grading Scale:

A – 90% and above;
B - 80% and above;
C - 70% and above;
D - 60% and above;
F – below 60%.

Course Materials

Course Text

R.J. Brooker (2024) Genetics Analysis & Principles (8th Edition). McGraw-Hill Educ. ISBN-13: 9781265350796, ISBN-10: 12653500795 (hard copy); ISBN-13: 9781266822988, ISBN-10: 12668222984 (spiral bound); ISBN-13: 9781266823992 (ebook) (One of those is Required.)

Outside Materials

Journal articles, website links of interest, etc. will be provided at lectures and on Canvas.

Course Website and Other Classroom Management Tools

All lectures and most important outside materials (OMs) will be posted on Canvas (typically after the class for regular lectures, before the class for interactive lectures). It is highly recommended that students take notes to supplement their understanding of lectures and OMs.

Course Contents

Schedule of Lectures and Exams

Will be posted on Canvas at the beginning of the semester. It is subject to change in accordance to the actual course progression.

Topics Covered

- Concepts of Inheritance, Gene and Life Cycles
- Recombination and Mapping
- Chromosome Variations and Transpositions
- Non-Mendelian Inheritance
- Gene Mutation and Repair
- Gene Expression and Regulation
- Genetic Engineering and Genomics
- Quantitative, Population and Evolutionary Genetics
- Genetic Basis of Human Evolution and Disease

Course Expectations & Guidelines

Academic and Research Honesty/Integrity Statement

Georgia Tech aims to cultivate a community based on trust, academic integrity, and honor. Students are expected to act according to the highest ethical standards. Review the Academic Honor Code at <http://www.catalog.gatech.edu/policies/honor-code/> or <http://www.catalog.gatech.edu/rules/18/>. Any student suspected of cheating or plagiarizing on a quiz, exam, or assignment will be reported to the Office of Student Integrity, who will investigate the incident and identify the appropriate penalty for violations.

Accommodations for Students with Disabilities

If you are a student with learning needs that require special accommodation, contact the Office of Disability Services at (404) 894-2563 or <http://disabilityservices.gatech.edu/> as soon as possible to make an appointment to discuss your special needs and to obtain an accommodations letter. Please also E-mail me as soon as possible in case if there is a necessity to set up a time to discuss your learning needs.

Attendance and/or Participation

Class time will be used for lectures, quizzes, group activities, and exams. If you miss lecture, *you* are responsible for obtaining all notes, announcements, and assignments. Written confirmation of a legitimate excuse, such as a severe illness, will be required if any assessment is missed. The institute's excused absence policy will be enforced in this course (<http://www.catalog.gatech.edu/rules/4/>).

Extensions, Late & Missed Assignments

Unless stated otherwise in the specific assignment guidelines, there will be no credit given for any assignments turned in after the deadline. Students that miss any required assignments/exams for approved Institute activities and religious observances will be excused for any missed credit or given an opportunity to take assignments at different time periods, assuming that proper documentation is provided. See <http://www.catalog.gatech.edu/rules/4/> for more information. For documented excused absences at the assignments that can not be rescheduled such as unannounced quizzes, alternative assignments will be given at the end of the semester only in case if participation in the missed assignment could influence the total grade in the class.

Student-Faculty Expectations

At Georgia Tech, we believe that it is important to strive for an atmosphere of mutual respect, acknowledgement, and responsibility between faculty members and the student body. See <http://www.catalog.gatech.edu/rules/22/> for an articulation of some basic expectation that you can have of me and that I have of you. In the end, simple respect for knowledge, hard work, and

cordial interactions will help build the environment we seek. Therefore, I encourage you to remain committed to the ideals of Georgia Tech while in this class.