

AP BIOLOGY

Ivy Collegiate School

2022-2023

Department: Science	Time: MTuW 3:20 – 4:20
Email: science@ivycollegiateschool.org	Place: 806 (Science Lab).

Course References: This is a list of various interesting and useful books and online resources that were used in the construction of the course. You are not required to purchase all of these (only those noted as such), but they may be useful for occasional consultation. (Note: They are available in the restricted library.)

- Jane B. Reece, Lisa A. Urry, Michael L. Cain, Steven A. Wasserman, Peter V. Minorsky, and Robert B. Jackson, *Campbell Biology*, Pearson, 9th ed., 2010. REQUIRED.
- Jane B. Reece, Lisa A. Urry, Michael L. Cain, Steven A. Wasserman, Peter V. Minorsky, and Robert B. Jackson, *Campbell Biology, Investigating Biology Lab Manual*, Pearson, 10th ed., 2014.
- Deborah T. Goldberg, *Barron's AP Biology*, Barrons Educational Series, 7th ed., 2019.
- *MCAT Biology Review*, Princeton Review, 2nd ed., 2016.
- *MCAT Biochemistry Review*, Princeton Review, 2nd ed., 2016.

Objectives: This course is an intensive introduction to the concepts and practices of the biological sciences. The course has both lecture and lab-based components. After introducing students to the key principles of biochemistry and molecular biology, they move on the study of the cell and its energetic processes. In the genetics unit, students will learn about the molecular and chromosomal bases of inheritance, the central dogma of biology, and modern applications of biotechnology. Students practice lab techniques like gel electrophoresis. The unit on evolution emphasizes several of the key themes of biology, including how structure and function influence both organization and adaptation. Students explore the remarkable range of diversity of lifeforms and their unifying characteristics. Moving on to topics in animal form and function, students will gain a more detailed understanding of individual organ systems and their roles within organisms. Finally, the course relates the microscopic to the macroscopic in the unit on ecology and conservation biology by exploring topics such as population dynamics, ecosystems and their communities, and the restoration of the environment. The course breakdown is as follows: 25% molecules/cells, 25% genetics/evolution, and 50% organisms/populations. This course is also comprised of four "Big Ideas":

- BIG IDEA #1: Evolution
- BIG IDEA #2: Energetics
- BIG IDEA #3: Information Storage & Transmission
- BIG IDEA #4: Systems Interactions

Students who are successful in this course and have an interest in the life sciences are recommended to proceed to the Biochemistry course for further investigation into its practices and principles.

Co-/Prerequisites: Biology I or recommendation by the Faculty

Notes on AP courses: AP courses culminate in an examination May with scores ranging from 1 to 5 (5 - Extremely well-qualified; 4 - Well-qualified; 3 - Qualified; 2 - Somewhat qualified; 1 - Not qualified). Students are expected to devote additional time beyond their normal class and homework hours to preparing for this examination. While time for instructor-led review is always allotted during the Spring semester, it is important that students begin their review independently and early. At ICS, AP courses have an additional component in the requirement of the completion of a Capstone Project at the end of the year (in lieu of a traditional Final Examination). More details regarding the Capstone Project(s) may be found below.

AP Biology Course Outline:

█	Week One	.....	Course Themes
█	Week Two	.....	Biochemical principles and water
█		█	Properties of water (LAB)
█	Week Three	.....	Cell structure/Function and metabolism
█	Week Four	.....	Cell communication and the cell cycle
█		█	Onion root-tip (LAB)
█	Week Five	.....	Cellular respiration and photosynthesis
█	Week Six	.....	Meiosis, genes, and the chromosomal basis of inheritance
█	Week Seven	.....	Genes, proteins, and regulation of expression
█		█	Virtual drosophila lab (LAB)
█	Week Eight	....	Viruses, biotechnology, and the evolution of the genome
█	Week Nine	.....	REVIEW
█	Week Ten	.....	Mechanisms of evolution and origin of species
█		█	Virtual Hardy-Weinberg lab (LAB)
█	Week Eleven	.....	Phylogeny, bacteria and archaea
█	Week Twelve	.....	Protists and plant diversity
█	Week Thirteen	.....	Vertebrates and invertebrates
█	Week Fourteen	.....	REVIEW
█	Week Fifteen	.....	Plant structure, transport, and reproduction
█	Week Sixteen	.....	Plant signalling, animal form/function, the immune system
█		█	Fetal pig dissection (LAB)
█	Week Seventeen	.....	Neurons, signalling, and nervous systems
█	Week Eighteen	.....	Population and community ecology
█	Week Nineteen	.....	Ecosystems and conservation biology
█		█	Dissolved oxygen (LAB)
█	Week Twenty to Thirty-two	.....	SPRING REVIEW PERIOD
█	Week Thirty-three to Thirty-seven	.....	CAPSTONE RESEARCH
█	Week Thirty-eight	.....	CAPSTONE PRESENTATIONS

Grading Policy: Homework and quizzes (60%), Finals and Project (40%)

Capstone Project: The Capstone projects are designed to give you the opportunity to showcase (beyond the examination) what you have learned and the skills you have mastered as part of the course. While every project assignment may be different in scope, target, grading, and type of organization, each is intended to require you to “dig deep” and impress us with your creativity. For this set of courses, you are required to submit a project that captures the full-depth of your knowledge of select topic(s) from the course. Examples may include writing an original research paper related to a topic you have learned in class, producing a 30-minute video tutorial on a select topic, or creating a model (past example: students produced 3D-printed protein models using the NCBI Protein Database). Rubrics will be available in the Spring semester.

Important Dates:

Final Examination, Semester I Dec 2022
AP Examination May 10, 2023
Capstone Deadline TBD

Course Policy:

- Students are required to complete reading guides each week and keep an organized lab notebook.

Class Policy:

- Regular attendance is essential and expected.
- All assignments should be submitted on time and with work shown.

Academic Honesty: Students are expected to abide by the policies regarding Academic Honesty as laid out in the ICS Student Handbook. Any violations will be forwarded for administrative review and the possible imposition of academic penalties.