

Governor's School Course Information: Advanced Biological Analysis (4371)

Instructor:

Mary K. Patterson, Ph.D.
Phone: 766-1100 x3324
Classroom & Office: A61
email: mary.patterson@nhrec.org

Communication with Instructor: In addition to time in-class and the above contact information, the instructor can be reached via CANVAS www.newhorizons.instructure.com, in which students are already enrolled. Use the **InBox** feature in Canvas.

Advanced Biological Analysis (4371): *(2 weighted high school science credits)* In the fall semester, topics in the field of cell and molecular biology will be addressed, some of which include the roles of biological macromolecules, cellular organization and metabolism, and cellular processes such as communication, reproduction, respiration, and photosynthesis. In addition, mechanisms of inheritance and control of gene expression will be examined, followed by a study of developments in biotechnology. In the spring semester, evolution, phylogeny, and the diversity of living things will be discussed, with a special focus on the anatomy and physiology of animals. The laboratory experience is a major component of the course, allowing students the opportunity to use technologies applied in research, medical, and forensic laboratories while designing their own experiments and analyzing and interpreting their results. The anatomy and physiology of various vertebrate organ systems will be compared while dissecting animals in the laboratory. *Advanced Biological Analysis is a college-level course that examines the topics typically studied during the first year of college by biology majors. Prerequisite Advanced Chemical Analysis.*

Textbook: Biology, 11th Edition, Campbell and Reece, 2016. (Provided for student use)

Access to www.masteringbiology.com link provided via CANVAS

Lab materials: printed and distributed, or provided electronically via CANVAS, throughout the school year, as needed

Course Meetings:

AM Governor's School: M, T, Th, F: 7:10 – 8:45 a.m.; W 7:10 – 8:25 a.m.

PM Governor's School: M, T, Th, F: 1:00 p.m. – 2:35 p.m.; W 1:20 p.m. – 2:35 p.m.

Grading Scale: A = 90-100%, B = 80-89%, C = 70-79%, D = 60-69%, F = less than 60%

Quarterly Grades:

Semester Grade Determination:

Tests – 30%

Quizzes – 25%

Projects & Assignments – 20%

Lab Assignments – 25%

S1 Grade = 50% Q1 + 50% Q2

S2 Grade = 50% Q3 + 50% Q4

Yearlong Grade = 50%S1 + 50%S2

Instructional Methods: The Advanced Biological Analysis course is a blended course. In addition to in-class instruction, students will take notes and interact with instruction via videos, reading assignments and tutorials at home, submitting notes or other assignment work for a grade and instructor feedback. In-class sessions, which are 90 minutes in length, will incorporate laboratory experimentation and analysis, class discussions, reading and discussing contemporary scientific literature, and projects. Safety in the laboratory is a priority and safety rules will be strictly enforced, including wearing covered shoes (students are encouraged to leave a spare pair of covered shoes in the laboratory), as well as tying back long hair, and wearing splash goggles. Laboratory coats and nitrile gloves will be supplied by GSST for those laboratory experiments necessitating this personal protective equipment.

At any point in the school year during which students must learn virtually (including individual student absences), there will be a combination of synchronous live sessions and asynchronous independent and group work, with assignments to be submitted. During *Live* sessions, students should expect mini-lectures, large- and small-group discussions, small-group projects, and presenting to the whole class. **It is expected that students attending virtually via Zoom will have their camera turned *on* and participate in the class activities and discussions.** If

there are difficulties fulfilling the camera-on expectation, a parent-teacher conference is required to determine appropriate accommodations.

Homework & Assignments: In addition to note-taking from videos or readings, students will be responsible for making progress on assignments. Often, some of the work will be completed in class where the student can get assistance from the instructor as well as peers. Effective time management during class will decrease the amount of out-of-class time required.

Tests & Quizzes: All quizzes and tests will include free response questions in addition to multiple choice questions. Tests and quizzes will cover information covered in assigned videos/text readings as well as information discussed in class and content learned through class activities and lab experiments. *Students should expect to answer questions from labs as well as previous units on any given test or quiz.*

Laboratory: Generally, 3-6 hours per week will be spent in class doing experiments and other lab activities that correspond with chapter/lecture topics. A laboratory notebook will be provided, with mandatory entries, as assigned. In addition to the lab notebook, appropriately-formatted data, and answers to specific questions will be turned in for most lab activities. A formal lab report may be required for some experiments. In most cases, a prelab assignment will be due on lab day to show that the student is prepared for lab. **Prelab assignments are not accepted if turned in late unless the student is absent on the day the assignment is due, in which case, it will be accepted on the FIRST day of the student's return to class.** See the late policy.

Late Assignments: Assignments will be submitted via Canvas LMS, except for some assignments and quizzes/tests that will be submitted on paper. Assignments should be submitted on, or in advance of, the due date and time. **If a student is absent the day an assignment is due on paper, they may submit their work electronically on time, or on paper the first day of their return.** ***Assignments submitted after the due date will be penalized at a rate of 10% per day and will receive a zero if submitted after instructor feedback for that assignment has been distributed to the class.***

Absences: Missing class is strongly discouraged! A great deal of learning occurs during each class period, whether we are meeting face-to-face or virtually. In addition, the impact is not just to the absent student, but to laboratory partners and to the class as a whole who are deprived of the missing student's contributions to discussions.

- If an absence is unexpected (i.e., due to illness, family emergency, etc.) ***parent/guardian communication is expected within a day of the absence to explain the absence.*** Hand-written notes, emails, and phone messages are all acceptable. Subsequent communication between the instructor and student will allow for mutual agreement for the terms of make-up work. Communicate directly with the instructor via email or telephone.
- In the event of a long-term absence, alternate assignments will be made to accommodate student needs. In support of optimal learning potential, the instructor will determine a reasonable timeframe for make-up work to be submitted in order to gain credit for the submissions.
- The availability of laboratory materials (often LIVE organisms, enzymes with brief functional time-frames, etc.) will dictate whether or not make-up laboratory experience can occur. Under the circumstances that this is not possible, the instructor will provide the student either data from which a formal lab report (format to be discussed as needed to the topic) with background research citations or with an alternate assignment, in order to make up for the missed experience.

Animal Dissections: During the second semester, a variety of preserved animals will be dissected. This is a highly valuable learning experience that is strongly recommended. If a student prefers not to dissect, or if we find ourselves limited to virtual learning, comparative anatomy will be addressed via virtual dissection using software, internet videos and tutorials, as well as diagrams and photos from previously dissected organisms.

Classroom Expectations: *These will change to reflect the learning format (virtual, hybrid, face-to-face)*

1. **Biology is a fascinating subject! It is expected that every member of the class will make a concerted effort to learn by working through lessons and assignments, delving into assigned readings and videos with a curious mind-set, and attempting to make connections between new and previous information.** The instructor will provide feedback to students in writing or verbally after assignments have been submitted and it is expected that the students will review and consider the feedback, to help the student improve in understanding and application.
2. **Distance learning strategies will be employed at many points throughout the school year, including on Early Release or No-School days for the various home schools, days**

missed due to inclement weather, responding to mandated closures, and for individual home-bound students. When distance learning, real-time *Live* Zoom sessions may be required and/or asynchronous work may be assigned. Attendance will be recorded as a function of participation in live sessions and group meetings, measured through real-time oral or written responses to discussion questions when students will be called upon by name as well as asynchronous assignments.

Distance learning requires some shared etiquette. As you prepare to “join” the class conference, allow your microphone to be functional, but mute your microphone to prevent feedback. **Students are required to have video ON**, as this is helpful to the entire class learning environment, unless a Parent-Teacher conference has determined an alternative expectation without the camera on. Respectful dialogue, whether written in the Chat or stated aloud, is expected.

3. Each student is expected to pay attention and participate in class in a meaningful way. Students should take notes during lecture and class discussions, so they can track conversations and respond appropriately. Some assignments will be marked as having no credit attached – students will get feedback via class discussion, instructor feedback, or self-checks using a provided key. While these assignments, based upon a student’s ability to use resources to get information, gain no credit, they are nonetheless critical to the student’s achievement of success in the course, preparation for graded assignments and assessments, and are expected to be completed by the due dates given.
4. Inappropriate conduct will not be permitted. Your teacher will warn you if inappropriate conduct is observed. If a few verbal warnings are not effective at correcting an inappropriate behavior, a student’s parent/guardian will be contacted and the GSST administration will be notified.
5. Many assignments will be submitted and evaluated electronically, while others will be submitted on paper. Due dates are posted for each assignment. If a student has accommodations for extra time, the student must let the instructor know and have a guidance counselor provide documentation. Assignments will include lab activities and answers to thought questions, tutorials and quizzes in MasteringBiology (linked to our Canvas course), assignments that are uploaded as documents, pdf, videos, and photos as jpeg. *Because photos of written assignments are generally illegible, it is required that these assignments are done electronically and submitted, or scanned (table-top scanner or scanning app on personal device) and uploaded.* **Office Lens for Android and Genius Scan for iPhone are two quality free scanning apps.**

7. The instructor can only be an advocate for the student if the student communicates with the instructor. Every effort to coach and guide students to their highest success will be made. However, expectations will not be lowered.

Topic Schedule for 2024-2025.

Please note that this schedule may change. Topics may be rearranged, added, or eliminated.

FALL SEMESTER:

Chemical Basis of Life

Properties of Water (Chapter 3)

Chemical Bonds, Uniqueness of Carbon, Functional Groups (Chapter 4)

Biological Macromolecules (Chapter 5)

Cell Structure

The Anatomy and Physiology of the Cell and the Importance of the Cell Membrane (Chapters 6 & 7)

Metabolism

Mechanisms of Cell Communication and the Roles of Enzymes in Cells (Chapters 8 & 11)

Photosynthesis & Release of Energy

Important Biochemical reactions: Cellular Respiration and Fermentation (Chapter 9)

Photosynthesis (Chapter 10)

Cell Reproduction, Mitosis and Meiosis

The Cell Cycle, Regulation of the Cell Cycle, and Cancer (Chapter 12)

Meiosis & Gamete Production (Chapter 13)

Inheritance Patterns and Role of Chromosomes

Mendelian Genetics and the Role of Chromosomes in Inheritance (Chapters 14 & 15)

DNA Structure and Function

DNA Structure and Gene Expression (Chapters 16 & 17)

Uses of DNA Technology in the World Today (Portions of Chapters 20 & 21)

SPRING SEMESTER:

Biotechnology

Regulation of Gene Expression (Chapter 18)

Uses of DNA Technology in the World Today (Portions of Chapters 20 & 21)

Evidence and Processes of Evolution

Population Genetics, Natural Selection, and Evolution (Chapters 22-24)

Noncellular Pathogens

Viruses, Viroids, & Prions (Chapter 19)

Diversity of Life

Phylogeny and the Diversity Prokaryotes, Protists, Fungi, and Plants (Chapters 26-31)

Plant Diversity (Chapters 29, 30)

Fungi (Chapter 31)

Animal Development and Diversity: Invertebrates and Vertebrates (Chapters 32-34)

Plant Anatomy and Physiology

Plant Structure, Growth & Development, How Plants Obtain and Transport Resources, and Plant Reproduction (Chapters 35, 36, 38)

Animal Anatomy and Physiology

Animal Form and Function: Nutrition, Circulation and Gas Exchange, Immune System (Chapters 40, 41, 42, 43)

Ecology

Population, Community, and Ecosystem Ecology (Chapters 52-55)

College Credit: Students may receive two semesters of college credit (8 credit hours) for this course by dual enrolling at Virginia Peninsula Community College. Details will be provided during the first week of school.

While GSST will do all in its power to secure dual enrollment (DE) status for its courses, dual enrolled course credits are not guaranteed. Since the Virginia Community College System (VCCS) and Virginia Peninsula Community College (VPCC) set the criteria for DE and must approve each course and instructor, unavoidable circumstances that are not within the control of GSST may change the DE eligibility of any given GSST course. Alternative pathways for meeting specialty program requirements (E.g. concurrent Associates Degree) should be discussed in advance with the home high school counselor.

Implications of Dual-Enrollment

The decision to dual-enroll in a course requires careful consideration. You have options, as you can see from the [DE module](#) on Faculty Advising Canvas course. You may wish to contact your top choice colleges to ask what the impact of taking a dual-enrollment course might be for your goals, particularly if you do not perform to your expectations in the course. Please be aware that you are generating a permanent college transcript with all the courses for which you are dual-enrolled. You can also use the dual-enrollment student guide from [Transfer Virginia](#) to help you determine the potential impact.

If you choose to dual-enroll, you must monitor your course grade. If you find you are not earning grades you want to have on your permanent college transcript, you may consider dropping the dual-enrollment portion prior to the Add/Drop date for the term of the course, or to withdraw from the dual-enrollment portion prior to the Withdrawal date. If you choose to withdraw from dual enrollment for the class, you will still earn high school credit and can plan to be well-prepared for the class in college. Dropping will have no record on your transcript, while withdrawal will leave a note on your college transcript indicating you withdrew, but no

grade will be recorded on your college transcript. You can request a decline or withdrawal form from Dr. Patterson or from Mrs. Yee.

No matter what you choose to do, your wishes will be respected. Your learning will be supported, but no one can learn the information for you; you will have to invest effort in the course in order to succeed. This may require you to develop new learning strategies that you haven't used in the past.

Students must keep in mind that enrollment in a college class, including dual-enrollment while in high school, entails consequences that can be significant and permanent including, but not limited to, the following:

- Final course grades on college transcripts become a **permanent part of a student's college record.**
- Graduate-level education programs may consider DE grades equally with traditional college courses in calculating GPA for admission (E.g. graduate, medical, veterinary schools).
- Grades of D and F and course withdrawals can negatively affect scholarship and financial aid requests.
- Once the withdrawal date has passed, students cannot withdraw from a class, except in extraordinary circumstances such as a medical emergency.

Fall 2024

- Last day to register = **Fri 9/26/2025**
- Last day to drop = **Wed 10/8/2025**
- Last day to withdraw = **Tues 11/25/2025 (before Thanksgiving break)**
- Grades Due = **Mon 1/26/2026**

Academic Integrity Guidelines: All students are required to take responsibility for upholding everyone's honesty in the classroom. All students will sign a copy of the GSST Honor Pledge during the first week of school.

The Pledge: "I pledge to support the Governor's School for Science and Technology (GSST) Code for Academic Work. I will refrain from any dishonesty or deception, such as cheating or plagiarizing, which are honor code violations, on any and all academic work. I am further aware that as a member of the academic community, I should report any suspected violations to an instructor."

No form of cheating, copying, or plagiarizing will be tolerated. Homework and class assignments are independent work and should not be copied from any source, including AI sources, such as ChatGPT. Students may share lab data collected by members of their group, however lab reports and all other written assignments are to be done independently unless the assignment clearly states that it is group work. The level of collaboration allowed between students will be indicated on each assignment. In addition, students will read and sign the *Appropriate Collaboration* form to clarify types of assistance that are encouraged vs. not tolerated in this course.

In the case of copying, there will be **no determination of who copied from whom; all students involved will receive no credit for the assignment and the students involved may be referred to the GSST administration for disciplinary action. Detection of AI generated responses will result in no credit for the assignment and a parent conference will be scheduled.** Regarding tests and quizzes, if students share information during an assessment or look at notes, internet sources, or other materials during the assessment, all students involved will receive no credit for the assessment and the students will be referred to the school's administration for disciplinary action.

No forms of Generative AI are authorized for use in completion of assignments unless explicitly authorized for specific assignments by the course instructor. When AI tool usage is allowed, exercise caution and ensure that you appropriately cite and attribute any content generated through their use. It is essential to strike a balance between leveraging the advantages of AI resources and preserving your individual creativity and problem-solving abilities. Failure to adhere to the specified Generative AI usage guidelines may result in academic consequences. Pay careful attention to the assignment requirements to determine whether AI tools are permitted and follow the instructions accordingly.

To avoid plagiarism, all research sources must be cited properly to give the author(s) credit. In addition, **such information will be summarized or paraphrased, never just copied from its source.**

The goal of the Governor's School is not only to help students to gain acceptance to top colleges and access learning and career opportunities, but to thrive and excel once they have gained that entry. To this end, we take the academic integrity of each of our students very seriously.

GSST [Grade Change Appeals Procedure](#)

Student Learning Outcome 1

Students will be able to explain the processes by which energy enters living organisms and what happens as it passes between and through all levels of the biological hierarchy. Students will also be able to compare and contrast the processes by which matter moves through and between organisms/levels of organisms.

Student Learning Outcome 2

Students will be able explain how information is stored in biological systems, how it is accurately replicated, and how the information is processed and used by individual cells/organisms. Students should also be able to explain how that information flows between generations and the patterns of inheritance that result. Students should also be able to describe the application of these concepts.

Student Learning Outcome 3

Students will be able to explain the process of evolution by natural selection, including molecular influences and how that process has affected all life forms in the past and continues to do so today. Students should also be able to explain historical examples and current examples. Students should be able to summarize the evidence for evolution and modifications made to the basic Darwinian explanation.

Student Learning Outcome 4

Given different the levels within the hierarchy of science in general and biology in particular, students will be able to analyze the interrelationships between structural elements at that level and the functions performed. Students will also be able predict the resulting changes that may occur when a structural element of a hierarchy is changed.

Student Learning Outcome 5

Given any biological system, students should be able explain how the parts of the system interact to make the functioning system a whole entity. Students should also be able to

describe the emergent properties at any level within a biological system. Students should have experience applying the scientific process by using a model or simulation to describe a system and predict/demonstrate how changes in the model affect the system.

Student Learning Outcome 6

Students will be able to explain the process by which science seeks to understand the world around us. This area should include the design of a hypothetical experiment to test a hypothesis either given to the student or derived by the student from observations provided. Students should be able to identify the role of observation in this process.

Student Learning Outcome 7

Complete a dissection of a laboratory mammal and demonstrate knowledge of the anatomy and function of its systems.

PAGE Intentionally left blank

Please return only this page to your teacher after you and a parent/guardian have read the syllabus, no later than Friday, September 12th, 2025. Retain the rest of the syllabus for your records and review.

I have read the syllabus for Advanced Biological Analysis at GSST. I will contact Dr. Patterson, by phone at 766-1100, x3324, via CANVAS In-Box, or by email mary.patterson@nhrec.org if I have any questions.

Date: _____

Student's Printed Name: _____

Student's Signature: _____

Parent/Guardian's Signature: _____