



Biology Course & Lab

Yearlong 2020/21



ELIGIBLE STUDENTS:

9th--12th graders Students must be able to read the text, take notes, memorize vocabulary and express themselves through predominantly essay exercises. They must have the maturity to study regularly, keep pace with the course and dedicate the time needed to complete the work.

Please note: Students enrolled in this course will complete a variety of laboratory experiments and write six full laboratory reports. The laboratory manual that accompanies the text is still being developed. The experiments will be released as the authors produce them. A current list of supplies is not yet available, but a compound microscope will be needed to conduct microscopic viewing of certain microbes, cells and plant parts. Dissections will be completed in the spring semester. The laboratory supplies will need to be collected prior to class and the students must be ready to conduct the experiments during organized class time. The student completing this course earns one high school course credit.

Class Dates: Begin Wednesday, September 9, 2020; running through Friday, May 28, 2021.

Class Times: Monday, Wednesday & Fridays: 12:30-1:45pm (EST)

Instructor: Kathryn Morton, DVM

E-mail: kmorton.scholeacademy@gmail.com

OFFICE HOURS: Fridays 11:30am-12:30pm. In addition to scheduled class times, this is an *optional* weekly session where students may raise questions, seek assistance, or review class material. Students do NOT need to stay for the whole hour, but they must let the instructor know by 11:30 if they will be attending that day.

SCHEDULE FOR BIOLOGY:

CLASS SESSIONS DATES:

Classes will take place on Monday, Wednesday & Fridays: 12:30-1:45pm (EST)
for 32 weeks and 95 classes on the following dates* --

September (10): 9, 11, 14, 16, 18, 21, 23, 25, 28, 30

October (13): 2, 5, 7, 9, 12, 14, 16, 19, 21, 23, 26, 28, 30

November (10): 2, 4, 6, 9, 11, 13, 16, 18, 20, [Thanksgiving Break] 30

December (8): 2, 4, 7, 9, 11, 14, 16, 18, [Christmas Break]

January (9): [Christmas Break], 11, 13, 15, 18, 20, 22 [End 1st Semester], 25, 27, 29

February (9): 1, 3, 5, 8, 10, 12, 15, 17, 19 [Winter Break]

March (12): 1, 3, 5, 8, 10, 12, 15, 17, 19, 22, 24, 26

April (12): [Holy Week], 5, 7, 9, 12, 14, 16, 19, 21, 23, 26, 28, 30

May (12): 3, 5, 7, 10, 12, 14, 17, 19, 21, 24, 26, 28 [End 2nd Semester]

**Please note the above dates and times are the anticipated class sessions for this course. However, all dates are subject to change as the instructor's circumstances might dictate (e.g. illness, family emergency). Any classes canceled by the instructor will be made up at an alternate time designated by the instructor.*

BIOLOGY COURSE MAP

QUARTER 1 (Sept 8-Oct 30)

1. Insect Collection
2. (1) Biology: The Study of Life
3. (2) Atoms and Molecules
4. (3) The Cell

QUARTER 2 (Nov 2-Jan 22)

1. (4) Energy in the Cell
2. (5) The Central Dogma and the Cell Cycle
3. (6) Meiosis and Genetics

QUARTER 3 (Jan 25-Mar 19)

1. (7) Classification and Microorganisms
2. (8) Fungi and Plants
3. (9) Animals

QUARTER 4 (Mar 22-May 28)

1. (10) Human Organ Systems
2. (11) Ecology
3. (12) Theory of Evolution

REQUIRED COURSE TEXTS AND SUPPLIES [THIS LIST IS STILL BEING DEVELOPED]:



- 1) *General Biology*, by Heather Ayala and Katie Rogstad. Novare Science and Math. Available Summer 2020.
- 2) General Biology solutions manual (Novare) (Not yet available for purchase)
- 3) Biology Experiments Lab Manual (Novare) (Not yet available for purchase)
- 4) *The Student Lab Report Handbook* 2nd Ed. by John D. Mays. Novare Science and Math. ISBN: 978-0-9883228-7-5
- 5) Compound Microscope (TBD)
- 6) Prepared microscope slide set (TBD)
- 7) Lens paper and microscope cleaning solution
- 8) *Dissection kit* (TBD)
- 9) Lidded box for insect collection (cigar box, cardboard box, wooden box...any type roughly 1 square foot of display space and at least 1 inch high.)
- 10) Insect spreading board Styrofoam (#BE-INSECBD)
- 11) Insect pins (#2), ball jar, cotton balls, non-acetone nail polish remover (Dollar Tree), cheap insect net (dollar store)
- 12) Colored pencils
- 13) Index cards
- 14) Spiral notebook or loose-leaf
- 15) Space in a 3-ring binder
- 16) Various household supplies

BIOLOGY COURSE DESCRIPTION:

Preparedness: Biology is for 9-11th graders. (Seniors welcome).

Content: This course is a robust, thorough investigation into the major areas of life science. *General Biology*, by Heather Ayala and Katie Rogstad, Novare Science & Math, is an inspiring and engaging text that speaks to students through quality language and thorough explanations. It builds gradually starting with the characteristics of all living organisms and the chemistry behind their life functions, then delves into the wonder of the cell and how it is structured and created to thrive and multiply. The second half of the text examines the unique features of the different kingdoms and their phyla and how the organ systems vary in form and function and culminates with a chapter on the human organ systems. A chapter is devoted to ecology, populations, communities and the environments where living organisms exist. Lastly, historical and current theories of macroevolution and microevolution, and mechanisms of speciation are addressed. A repeated theme is emphasized throughout the course: science is not in the business of proclaiming truth, but rather creating hypotheses and then conducting experiments which either support or oppose those hypotheses.

Class time will be devoted to the discussion of reading assignments and practice questions, explaining complicated concepts, conducting laboratory exercises, contemplating current events in biology, instilling good skills in scientific exploration and experimentation, learning quality techniques for documenting observations, and reviewing topics.

Parental Involvement: Parents are expected to support their student of biology in several ways. They are expected to

- 1) obtain the proper supplies required,
- 2) be present during laboratory exercises,
- 3) conduct occasional student-led conferences, and
- 4) encourage and support their student to academic success and help him/her seek help as needed.

Mastery: In order to prepare students for advanced biological study, this course uses a mastery approach. This is achieved by covering fewer concepts at a deeper level. Our goal is to have a solid, working comprehension of these concepts and ability to communicate them. Mastering these concepts now will create a tremendous foundation upon which higher level concepts can build in college. Regular review of important “standard concepts” throughout the year will keep topics relevant and fresh. Students will be expected to keep up with the daily workload of reading the text, taking notes, reviewing vocabulary, attending class, and completing the practice problems. This will get easier as good skills and habits are developed.

Integration: This course approaches science holistically, integrating history, English language, and the epistemology of science. During class we will contemplate and discuss these topics and outside of class students will write about them. We will consider the existence of scientific findings which may contradict biblical statements and explore meaningful, productive responses to them. We will discuss bias and how it affects science.

Laboratory: A good scientist must understand well-designed experimentation, the proper interpretation of results, and precise communication of his/her findings. The majority of the experiments in this course are qualitative and promote strong observation skills. The microscopy portion will be led by the teacher with a digital camera so students can find structures at home and compare theirs with the instructor. Dissections will be started in class and, if necessary, completed after class. Two quantitative experiments will be conducted, and full reports written. Guidelines for lab report writing will follow *The Student Lab Report Handbook* by John D. Mays. This manual should be purchased this year and used as a reference through college. It gives instruction on graphing results, grammatical requirements, hypothesis, and other components of high-quality laboratory reports.

Projects: Two projects will also be completed: an insect collection and a leaf collection. Due to seasonal variation, collections should be started in the summer/early fall. Insects will be caught live, humanely fumigated, dried on a Styrofoam drying board, and preserved in a lidded display box. Leaves will be pressed between absorbable paper and mounted into a display book and photos of trees and bark taken. Kits can be purchased (Home Science Tools) or home supplies can be used.

NOTE: Parents will be expected to be present during laboratory exercises to ensure the safety of their student and the following of proper procedure. Together they will pre-read the exercise and set up supplies prior to class time. Procedures will be followed during scheduled class time. Questions can be asked to the instructor during the exercise.

Grading: The grade will be based on several components: participation in class, quizzes, tests, projects and laboratory reports.

STUDENT EXPECTATIONS: EXECUTIVE FUNCTION SKILLS

Students enrolling in Scholé Academy's science program will be expected to show development of Executive Function Skills throughout the year. Executive Function Skills speaks to a set of qualities and skill sets students can develop and hone to better approach the courses, lectures, readings and teachers they will face in their future academic coursework.

The following five skills will be nurtured throughout this course.

1. An Engaged Student: One who is willing to step into the arena of class discussion, ask questions, supply answers, generate the internal dialogue necessary to determine if what's being discussed is important and necessary to himself.

2. Note Taking: A student who during and after being engaged with the class has been trained to note important and relevant content in an organized fashion (Cornell Notes)

would be a great option). His notes would then be consulted, independently, for application in assignments and assessments.

3. Attention to Detail & Preparedness: These students are ones who consistently adhere to deadlines, submission requirements, adhering to style guides and codes, confirm technology is working prior to the start of class, be responsible to determine how to proceed after an absence, be responsible for consulting his course syllabus and adjusting as the class proceeds, etc.

4. Employ Critiques: These students are ones who receive feedback to one of their submissions, and then are sure to apply that feedback to future assignments rather than repeating mistakes. These students also glean information from the live class critiques of fellow students and note mistakes to avoid by learning from others.

5. Initiative/Maturity: This student would hear the teacher comments and be able to assess whether or not the teacher was describing his work, and then take the initiative to schedule office hours with his teacher if necessary.

STUDENT EXPECTATIONS IN ACTION

In this class, students will be expected to listen attentively, participate actively in class discussions and practices. Students are expected to arrive to class on time and with all assigned material completed. The instructor will facilitate learning for the student, but the responsibility for staying up to date with classwork and assignments ultimately falls to the student.

Students who have not submitted their homework to the appropriate Schoology assignment folder prior to the start of class will not be permitted to join the live class session. Those students will be invited into a separate Zoom breakout room to work privately until they have completed the day's assignment. After they have completed their homework submission, they will be permitted to rejoin the class in session. A day spent in a breakout room will constitute an absence from class.

All assignments will be due into the appropriate Schoology Assignment folder prior to the start of class each day. Students turning in late work will earn a 10% penalty for each day the assignment is late. Students will submit their work by scanning their homework pages and uploading it into the Schoology assignment window. Photographs of completed assignments will not be accepted as they are incredibly difficult to read.

STUDENT EVALUATION: GRADING

While pursuing *Biology* through Scholé Academy will be “restful” (undistracted time to study the things most worthwhile, usually with good friends in a beautiful setting), we also recognize the need to provide grades for students who will be using this course as part of their prepared college transcript. It’s a delicate balance to achieve both restful learning and excellent academic performance. Earning a specific grade should not overshadow achievement goals for mastery of this discipline. Biology is one type of science, and mastery in this course will strengthen a student’s understanding and other science disciplines like chemistry, physics and engineering, as well as future study in college biology. I will assign the following grades to your student’s level of achievement: *magna cum laude* (with great praise); *cum laude* (with praise); *satis* (sufficient, satisfactory) and *non satis* (not sufficient). The achievement of magna cum laude (MCL) is difficult to obtain, and does not necessarily correlate to a 91-100% objective grade.

Ideally, every average student working diligently should do praiseworthy work (*cum laude*). Those who excel beyond this expectation will be the *magna cum laude* students, able to teach the content back to lower students. Students who do adequate but not praiseworthy work be designated *satis*. *Non satis* means lacking sufficiency or adequacy.

Inasmuch as you might be fully on board with this grading method in theory, there will undoubtedly be the need to complete a college transcript with either a numeric or traditional letter grade. Traditional percentage grades will be provided and will be readily accessed on the *Biology* Schoology page. Additionally, Dr. Morton will provide a transcript of that grade to the requesting parent at the end of the year.

STUDENT EVALUATION: MASTERY PORTRAIT

Mastery portrait: Students who are prepared to take this class are typically mid-teens--adolescents approaching young-adulthood. This developmental stage is an interesting one, brimming with lots of new characteristics. It’s imperative, then, that this course not only provide the academic components necessary to achieve mastery of the content of the class (knowledge) and skills associated with analytical thought (experimentation); but to also help engage the student in development of their intellectual virtues. These three aspects of the course would comprise the “learning target”.

At the completion of this course *cum laude* students will be able to do the following:

Knowledge & Skills:

- Explain the characteristics of all life forms.
- Know major classification groups, their characteristics and use a biological key to identify organisms.
- Know the main components of the prokaryotic and eukaryotic cells and organelles contained within each.
- Describe the major chemical components of living organisms, their synthesis and uses.
- Describe cellular respiration and how cells get their energy

- Have a working knowledge of protein synthesis, mitosis and meiosis. Know the differences between DNA and RNA.
- Conduct genetic surveys of phenotypical traits and complete dihybrid crosses on paper.
- Describe the major environmental cycles of water, oxygen, carbon and nitrogen; Explain the flow of energy through an ecosystem.
- Gain a working knowledge of the structure and function of animal organisms and their body systems. Compare one organism to another.
- Gain a working knowledge of the structure and function of plant organisms and their anatomic parts. Compare and contrast physiology and reproduction between plant groups.
- Learn basic microscopy and dissection skills.
- Gain superior observation skills and develop quality documentation skills with specimen collection, drawings, and the written word.

Intellectual Virtues:

- *Love* of what is true, good and beautiful
- Show *humility* as a student and willingly receive instruction
- Demonstrate *patience* in understanding
- Exercise *constancy* in effort
- Practice *perseverance* in study
- Show *temperance* toward their classmates and instructor
- Fight against intellectual vices like pride, dishonesty, envy, slothfulness, sensuality, irritation/impatience, and excessive ambition.

Significant advancements in the areas of virtues plus content and scholarship will lead to the mastery designation of ***magna cum laude***.

STUDENT EVALUATION: ASSIGNMENTS, TYPES & WEIGHTS

Dr. Morton will communicate with students regarding assignment feedback and grading through the free online grading system, Schoology. She will provide students with more detailed information and access to the Biology course page.

Student's grades will be comprised of:

1. Exams: 40%
2. Class Participation: 10%
3. Quizzes: 10%.
4. Projects: 10%
5. Laboratory Reports: 10%
6. Laboratory observations and worksheets: 10%
7. Final Exams: 10%

STUDENT EVALUATION: ACADEMIC DISHONESTY

Students will often take assessment tests and/or quizzes privately at home. Students are on their honor to abide by [Scholé Academy's Learning Philosophy](#) which assumes the personal cultivation of Student-Virtues and honesty described in the Student-Parent Handbook.

Additionally, plagiarism is a serious and punishable offense. Proper citation of all sources is essential to the academic endeavor. Remember to cite any source if the information is not common knowledge or is an opinion obtained through any source. A plagiarized assignment will result in a failing grade. Students should consult their chosen style manual (see Student Expectations above) for specific direction on obtaining, quoting and paraphrasing sources.

THE VIRTUAL CLASSROOM:

We will be using the free online “virtual classroom” software provided by Zoom, one of the leading companies that provides such software. The virtual classroom will provide students with interactive audio, text chat and an interactive whiteboard in which texts, diagrams, video and other media can be displayed and analyzed. We will provide students with a link (via email) that will enable students to join the virtual classroom.

Specific information regarding the technology used by Scholé Academy (including required technology) can be found by visiting the [Technology in the Classroom](#) section of the Student Parent Handbook.

Students will submit documents by scanning and uploading them to their personal computer, then attaching those files as .pdfs to an email. They will submit their work on the *Biology* course page on Schoology (access granted after enrollment is secured).

ABOUT THE INSTRUCTOR:

Kathryn Morton earned her BA in Biology from Illinois Wesleyan University and her DVM from the University of Illinois. Upon graduation from veterinary school, she moved to Pennsylvania to work as a clinical research veterinarian on a large dairy farm. From there she transitioned to a busy, small animal practice doing medicine and surgery. When the call of homeschooling touched her heart, she left private practice to focus on her husband and six children.

She has been teaching math and science courses to the homeschooled students in her local community for 14 years and she heads a robotics club at her town's public library. She is a

lifetime learner and enjoys teaching students about the beauty of creation, the skill of asking and answering hard questions, and the joy of intellectual perseverance.