

I. Course number and title:

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BIO 101: Fundamentals of Biology

Office Hours: M: 11:30 – 1:00
W: 11:30 – 1:00
Th: 1:00 – 2:00 IN CAMBRIDGE
Other times by appointment

II. Course description:

A study of the basic concepts of living organisms including cell including cell structure and function, metabolism, growth and reproduction, genetics, behavior, adaptation, and evolution for the non-science major. Topics provide an understanding of biological systems as a whole. Three hours lecture, two hours of lab per week. (4 credits). F, S (Note: Students cannot receive credit for both BIO 101 and BIO 111.)

III. Course objectives (Broad Goals of the Course):

1. To develop understanding and appreciation for the basic principles of the science of biology, starting with the cell.
2. To prepare students for more advanced courses in science, with an understanding of cell processes.
3. To provide students with knowledge necessary to help solve problems in biological areas, beginning at the cellular level.
4. To introduce students to the scientific method.
5. To provide students with laboratory experiences to develop laboratory skills.

IV. Specific objectives *Specific objectives are found in 3 places: in the text, in the lab manual, and in this syllabus.*

At the end of the course, the successful student will be able to:

1. Describe the characteristics found in all living organisms.
2. Explain the steps used in the scientific method.
3. Name the methods used to study cells and their importance.
4. Recall the two great unifying theories of biology and understand their significance.
5. Identify the chemical compounds found in the cell and understand their functions, including small molecules and macromolecules of biological important compounds.
6. Calculate the atomic number and atomic mass of a given atom.
7. List the properties of water.
8. Identify the organelles found in the cell and know the function of each.
9. Differentiate between the types of cell transport processes.
10. Differentiate between the light and dark reaction of photosynthesis.
11. Name the environmental factors important to photosynthesis.
12. Know the organelle and site of photosynthesis.
13. Differentiate between the different kinds of respiration occurring in the cell, including the site of respiration and number of ATP molecules produced.
14. Outline the events of glycolysis and cellular respiration.
15. Identify the steps in mitosis and explain their importance in cell division.
16. Differentiate between mitosis and meiosis including the number of cell divisions and chromosome numbers.
17. Describe the stages of meiosis I and meiosis II.
18. Set-up and successfully work a monohybrid, dihybrid, test, and sex-linked crosses.
19. Identify dominant, recessive, and incomplete dominant traits in humans.
20. Explain DNA replication.
21. Explain protein synthesis.
22. List the direct and indirect evidences for evolution.
23. State the approximate age of the earth, the time life first appeared, and the significant events of life occurring during the geological time table.
24. Explain the concept of evolution.
25. Identify the ancestors of modern humans and outline the evolution of Homo sapiens.
26. Use the key terms from the theory and laboratory components in application to everyday experiences.

Course Requirements: Complete the above objectives with a minimum passing grade (70% or greater) in both the theory and laboratory components of the course.

V. Biology 101 Course Schedule: *This schedule is subject to change at the instructor's discretion.*

<u>Date</u>	<u>Reading Assignment</u>	<u>Chapter(s)</u>
Aug. 24 / 25	A view of life: Introduction & the scientific method	1.2, 1.7, 1.8, 1.10
Aug. 26 / 27	Basic Chemistry (inorganic)	2 (all <i>except</i> 2.5)
Aug. 31 / Sep. 1	Simple organic chemistry, Enzymes, ATP	3.1 – 3.15, 5.13 – 5.15
Sep. 2 / 3	More Organic Chemistry (and exam review, for M/W class)	
Sep. 7 (M only)	NO CLASS: LABOR DAY	
Sep. 8 (Tu only)	Overflow / Review	
Sep. 9 / 10	EXAM I	

Sep. 14 / 15	Cell membrane structure; transport processes	5.1 – 5.9
Sep. 16 / 17	Cell structures and functions	4 (all)
Sep. 21-22-23-24	Chemiosmosis, Photosynthesis	7.1 – 7.11, 7.13, Lab 6
Sep. 28 / 29	Cellular respiration	6 (all <i>except</i> 6.11)
Sep. 30 / Oct. 1	Review	
Oct. 5 / 6	EXAM II	

Oct. 7 / 8	Cell reproduction: Binary fission, mitosis	8.1 – 8.11
Oct. 12 / 13	Cell reproduction: meiosis	8.12 – 8.24
Oct. 14, 15	Genes and chromosomes; Mendelian genetics	9.1 – 9.10, 9.14 – 9.18
Oct. 19, 20	Molecular genetics: DNA structure and replication	10.1 – 10.5
Oct. 21, 22	Gene activity: transcription and translation	10.6 – 10.16
Oct. 26, 27	Gene regulation; biotechnology; bioinformatics	TBA
Oct. 28, 29	EXAM III	

Nov. 2 / 3	Species and microevolution	14.1 – 14.3
	GENE ASSIGNMENT DUE (ONLINE SUBMISSION)	
Nov. 4 / 5	Natural selection	13 (all)
Nov. 9 / 10	Macroevolution and speciation; phylogenetics	1.1, 14.4 – 14.5, 14.10 – 14.11, 15.7-15.10, 15.13, 15.14 -15.17
Nov. 11 / 12	Scientific hypotheses about the origins of life	15.1 – 15.3
Nov. 16-17-18-19	Vertebrate evolution, mass extinction, primate evolution	19.1 – 19.10
Nov. 30; Dec.1-2-3	Hominid evolution	19.11 – 19.18
Dec. 7	Review/overflow/wrap-up (Monday only)	
Dec 9 (W)	EXAM IV: 8:30 – 10:30	

VI. Methods of teaching:

Lecture, discussion, cooperative learning, laboratory sessions (microscopy, biochemistry, biotechnology, dissection), current topics. A/V materials may include handouts, VHS cassettes, CD-ROM, internet materials, and/or DVDs to supplement content.

VII. Instructional Materials:

Required Materials:

Theory: Campbell, N.A., J.B. Reece, M.R. Taylor, E.J. Simon, and J.L. Dickey. 2009. Biology: Concepts and Connections, 6th edition. Custom edition for Chesapeake College. ISBN: 9780536696694

Laboratory: Mader, S.S. (2009). Customized Laboratory Manual Biology. (10th edition). ISBN: 9780077355609.

VIII. Criteria for Student Grading

Bio 101 will be graded on a 100-point scale, broken down as follows:

1. Theory Testing:	75%
3 Exams, 15% each	
1 Final Exam, 15%	
2 Quizzes, 2.5% each	
1 Writing Assignment, 10%	
2. Laboratory Grade:	25%
2 practical exams, 10% each	
average of 2 lab reports, 5%	

I DO NOT ACCEPT LATE ASSIGNMENTS.

All examinations are in the course schedule, and will consist of a mix of question types.

Course Grading Scale: The following grade scale will be used:

Grade	Range
A	90-100
B	80-89
C	70-79
D	60-69
F	Below 60

Attendance at any test or examination is mandatory.
There will be NO make-up examinations without PRIOR
arrangements with the instructor.

If, for any reason, a student is not able to take a test, the student must contact me and receive a reply BEFORE (not during or after) the scheduled test.

Plagiarism: The Chesapeake College Student Code of Conduct states:

“Academic Dishonesty includes, but is not limited to, the following:

1. Cheating on examinations.
2. Plagiarism, the representing of another’s ideas or writing as one’s own, including but not limited to:
 - a. Presenting all or part of another person’s work as something one has written;
 - b. Paraphrasing or summarizing another’s writing without proper acknowledgement;
 - c. Representing another’s artistic or technical work or creation as one’s own.”

In this course, students will be doing a lot of typing, weaving their ideas and others’ ideas together into coherent arguments. WHEN IN DOUBT, CITE YOUR SOURCES. Bio101 will follow a “zero tolerance” policy for plagiarism, which is punishable by failure of the assignment/examination, or failure of the course. In extreme cases, students may be dismissed from the College for academic dishonesty. See the Learning Resource Center homepage for citation help.

The complete Academic Dishonesty policy can be found in the 2008-2009 Chesapeake College Catalog. Standards for a “C” paper can be also found in that Catalog.

IX. Attendance: As stated in the Chesapeake College catalog.

Learning is facilitated with student involvement, interest and motivation and attendance. Therefore, students are expected to attend all classes and laboratories. In the event that a class is missed, it is the student's responsibility to make up any missed work, as the student will be held responsible for all materials covered.

The student is responsible for all work, labs, assignments, and announcements whether present or not. Experience has shown that a student who misses more than 5 classes cannot pass the course.

All electronic devices (cell phones, pagers, PDAs, etc.) should be turned OFF during instructional times. Laptop computers will be permitted as long as they are used to meet the educational goals of the course.

Special Needs Students: Student with special needs or disabilities who believe they may need accommodations in this class are encouraged to contact the ADA Coordinator at extension 5808 to arrange any needed accommodations.

Academic Support Services: The Academic Support Center, located on the first floor of the Learning Resource Center (Room L-105), provides many kinds of academic support for students. Drop-in tutoring, assistance in writing, math and other disciplines, scheduled tutoring, and peer-led instruction are all available. The ASC also coordinates the Supplemental Instruction program, in which Bio101 is a participant.

X. Selected Bibliography. GREAT BOOKS OF BIOLOGY: A chronological approach.

- The Origin of species, by Charles Darwin, 1859.
- Voyage of the H.M.S. Beagle, by Charles Darwin, 1909.
- Microbe Hunters, by Paul DeKruif, 1926.
- What is Life?, by E. Schroedinger, 1956.
- Silent Spring, by Rachel Carson, 1962.
- The Two Cultures, by C.P. Snow, 1964.
- Science and Human Values, by Jacob Bronowski, 1965.
- The Double Helix, by James D. Watson, 1968.
- The Sand County Almanac, by Aldo Leopold, 1968.
- The Population Bomb, by Paul Ehrlich, 1968.
- The Structure of Scientific Revolutions, by Thomas S. Kuhn, 1970.
- The Medusa and the Snail, by Lewis Thomas, 1974.
- Rosalind Franklin and DNA, by Anne Sayre, 1975.
- Sociobiology, by E.O. Wilson, 1975.
- Lives of a Cell, by Lewis Thomas, 1976.
- The Selfish Gene, by Richard Dawkins, 1976.
- Ever Since Darwin, by Stephen J. Gould, 1977.
- The Dragons of Eden, by Carl Sagan, 1977.
- On Human Nature, by E. O. Wilson, 1978.
- The Panda's Thumb, by Stephen J. Gould, 1980.
- The Mismeasure of Man, by Stephen J. Gould, 1981.
- Growth of Biological Thought, by Ernst Mayr, 1982.

(Carter, J.L. & Mayer, W.V. (1988). Reading beyond the textbook: great books of biology. BioScience, 38 (7), 490-492.)

G. Farley's Reading List: Books I've read in preparing for Bio 101.

The Third Chimpanzee, by Jared Diamond, 1992.

The Fossil Trail: How we know what we think we know about human evolution, by Ian Tattersall, 1995.

The Demon-Haunted World: Science as a Candle in the Dark, by Carl Sagan, 1997.

The Diversity of Life, by E.O. Wilson, 1999.

Guns, Germs, and Steel: The Fates of Human Societies, By Jared Diamond, 1999.

Mapping Human History: Genes, Race, and our Common Origins, by Steve Olson, 2002.

Mean Genes: From Sex to Money to Food – Taming our Primal Instincts, by Terry Burnham and Jay Phelan, 2002.

Charles Darwin: The Naturalist who Started a Scientific Revolution, by Cyril Aydon, 2002.

The Future of Life, by E.O. Wilson, 2003.

Missing Links: Evolutionary Concepts and Transitions Through Time, by Robert A. Martin, 2004.

Becoming Human: Evolution and Human Uniqueness, by Ian Tattersall, 1998.

*A Short History of Nearly Everything, by Bill Bryson, 2003.

The Republican War on Science, by Chris Mooney, 2005.

Gene Portfolio Entry

Purpose: To allow students to become thoroughly familiar with the concept of a gene, the research techniques used to work with genes, and the investigators who do that research.

Objective: The objective of this assignment is to demonstrate the student's ability to summarize information, evaluate issues, think critically, communicate effectively, and argue persuasively.

You will be assigned a gene in the first week of class. Over the course of the semester, you must:

- A) Develop a working definition for a gene. What is a gene, and what does it do?
- B) Apply your definition for a gene to the assigned gene. What does "your" gene do, and how does it work?
- C) Develop a history of the gene: when was it discovered, and by whom? Why were researchers originally interested in this gene? Does it have medical importance? Is it important to human biology? Is it important to our understanding of life on the planet, or animals in particular?
- D) Identify the research currently being done with the gene, and identify the researchers who are doing that research. What are the current goals, large and small, of the research program? How are the researchers funding that research?
- E) Prepare a portfolio entry for your gene; we will assemble a class-wide portfolio for all genes researched. The format for your entry will be discussed as a class before the project is due, but should include information from sections B, C, and D above.

The portfolio entry should be properly cited. Citation format varies among journals in biology, so we will follow the format below:

Last name, First name. Year of publication. Title (first word capitalized only). *Source* (journal or internet site, *in italics*), volume and page numbers (if journal) OR last date modified (if website).

The portfolio entry should be typewritten, double spaced, in a font of reasonable size.

Grading: To be included as 10% on the course's final grade.

Academic Instruction Emergency Management Plan

In the event that Chesapeake College needs to close for an extended period of time due to a flu pandemic, severe weather event, or other emergency situation, consideration will be given to the timing and duration of the closure as follows:

1. Closure during the semester for up to one week – there will be an opportunity to make up work missed without significant alteration to the semester calendar.
2. Closure extending beyond one week (or in situations where classes are cancelled on the same days/evenings over multiple weeks) – the College may extend the length of the semester. Depending on the timing of the closure, scheduled breaks, end of semester dates, and/or the processing of final grades might be impacted.

Students can acquire information about closures on the College website or by calling 410-822-5400 or 410-228-4360. Chesapeake College courses held at off campus sites will follow the protocol of the host facility.

<u>Week #</u>	<u>Laboratory experiment</u>
1 (Aug. 24 - 27)	#1, #2: Introduction: Safety and the scientific method; Metric measurement
2 (Aug. 31, Sep. 1-3)	#2: Microscopy
<u>LABOR DAY HOLIDAY: MONDAY, SEP. 7</u>	
3 (Sep. 8-10 [T-Th], 14 [M])	#3: Chemical Composition of cells
4 (Sep. 15-17, 21)	#5: Enzymes
5 (Sep. 22-24, 28)	#4: Cell Structure and function (Lab Report Due) **
6 (Sep. 29-Oct. 1, Oct. 5)	#6: Photosynthesis
7 (Oct. 6-8, 12)	Lab Practical I
8 (Oct. 13-15, 19)	#8: Mitosis and meiosis
9 (Oct. 20-22, 26)	#10: Human genetics
10 (Oct. 27-29, Nov. 2)	#11: Molecular genetics (Gel electrophoresis)
11 (Nov. 3-5, 9)	Handouts: Natural selection, Lethal recessive gene
12 (Nov. 10-12, 16)	#24: TBD; (Lab Report Due) **
13 (Nov. 17-19, 30)	#24: The Vertebrates: Kingdom Animalia dissections
<u>THANKSGIVING HOLIDAY: NOV. 23-26</u>	
14 (Dec. 1-3, 7)	Lab Practical II

* Labs must be **read** before coming to the lab. Be ready to start the lab promptly.
STUDENTS MUST SIGN THE SIGN IN SHEET FOR EACH LAB.

** Indicates laboratory report/s must be **Documented (Literature Cited)**. Use Appendix A in the lab manual as the format for writing the report.

PROPER ATTIRE IS MANDATORY TO BE ALLOWED IN THE LABORATORY:

- **LONG PANTS or DRESSES/SKIRTS**
- **CLOSED-TOED SHOES**

NO SHORTS NOR FLIP-FLOPS ARE ALLOWED IN THE LABORATORY.

NAME: _____ Course Section: BIO101- _____
Fall 2009
INSTRUCTOR: Gregory S. Farley

- 1) How many exams are there in the course? _____
- 2) How many practical examinations are there in the lab? _____
- 3) How many lab reports are there? _____
- 4) The writing assignment takes what form?
- 5) How do you avoid plagiarism?

I, _____, have DOWNLOADED a copy of the course outline; I have read the outline and have agreed to the evaluation criteria as stated.

Date: _____

COPY THIS PAGE INTO AN EMAIL, ANSWER THE QUESTIONS, AND EMAIL IT TO YOUR INSTRUCTOR