

# VALDOSTA STATE UNIVERSITY

## BIOLOGY 1107: Principles of Biology I FALL 2017

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INSTRUCTOR: Dr. J. A. NIENOW

OFFICE: 2089 Biology/Chemistry Building; 249-4844

Office hours: MTWTh 2:00 – 3:00 or by appointment

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### TEXTS:

- Sadava, A., H. C. Heller, G. H. Orians, W. K. Purves, D. M. Hillis. 2011. Life: The Science of Biology. 11th edition. W.H. Freeman & Co. Gordonsville, VA.
- Goddard, R. H. 2011. Methods and Investigations in Basic Biology. 5<sup>th</sup> edition. Hayden-McNeil Publishing, Plymouth, Michigan.

### OTHER RESOURCES:

- [BlazeView](#)
- <https://www.aamc.org/students/applying/mcat/preparing/>--contains information concerning biology, chemistry, and physics topics covered by the MCAT

PREREQUISITES: None.

CO-REQUISITE FOR BIOLOGY MAJORS: BIOL 1100

**COURSE DESCRIPTION:** An introduction to the principles of biology for science majors, with an emphasis on the cellular nature of life. Concepts covered include: the origin and early evolution of cellular life; cell structure, function, metabolism and reproduction; cell signaling; and gene regulation in bacteria and eukaryotes.

**GENERAL COURSE GOALS:** The primary goal of this course is to introduce you to the underlying principles of biology. Because this is an introductory course, no one topic will be studied in great detail. However, you should have sufficient background at the end of the quarter to pursue interesting topics in higher level courses. You should also gain the background necessary to understand the biology behind many of the problems and issues facing this country. It is also hoped that you will gain an understanding of how biologists and other scientists approach problems.

The biology program also seeks to develop some of your general college skills, in particular, your communication skills, your information processing skills, and your ability to think. Your communication skills will be exercised primarily through library assignments and written and/or oral reports of lab activities. Your information processing skills will be developed because of the nature of biology. You will be supplied with a large quantity of information in a very short time, which you must learn in some detail or you will not do well in this course. This will not be wasted effort, however. The ability to digest and incorporate large amounts of information quickly is a valuable skill in most fields of endeavor. Your ability to think will be involved in the analysis of lab exercises, class assignments, and test questions.

**SPECIFIC COURSE GOALS:** By the end of this course, students will be able to answer questions that demonstrate an understanding of fundamental concepts of biology, including

- the scientific method and experimental design; cellular structure, function, metabolism, and reproduction; the nature of the gene and its action; and the mechanisms of evolution (GEO 5; BEO 1-4);
- perform a variety of standard lab techniques used in biological research (GEO 5)

- use critical thinking skills and written communication skills to
- analyze and evaluate the content quality of written and visual media relating biological knowledge (GEO 4 & 7)
- present the results and conclusions of data collected in the lab in standard scientific writing format (GEO 4 & 7; BEO 1)
- conduct a literature review at VSU's Odum Library (GEO 3)

**ATTENDANCE:** Students are responsible for attending class and for the material presented in all classes. There will be no make-ups of missed labs, quizzes, and other assignments. **EXAMS MISSED WITHOUT PRIOR PERMISSION OF THE INSTRUCTOR MAY BE MADE UP, BUT THE FINAL SCORE WILL BE REDUCED BY 25%;** you must contact the instructor within one calendar week of the missed exam to have any hope of a make-up. Students who have missed 20% of regularly scheduled class meetings, especially labs, are subject to a failing grade for the course; **STUDENT'S MISSING 4 OR MORE LABS CANNOT AND WILL NOT RECEIVE A GRADE HIGHER THAN A D.**

**EXAMS (GEO 5; BEO 1-5):** There will be five unit exams, each worth 100 points. These exams will be composed of a mixture of multiple choice short answer questions. The dates of these exams are included in the attached schedule of lectures. **DO NOT MISS THESE EXAMS WITHOUT PRIOR PERMISSION.** A comprehensive final exam, worth 200 points, is scheduled for the end of the quarter. If you are caught cheating on an exam you will receive no points. Estimated total from exams--700 points.

**LAB QUIZZES (GEO 5 & 7; BEO 1):** Expect a 20-minute, 10- to 15-point quiz at the beginning of each laboratory. **DO NOT BE LATE.** The clock starts when the quizzes are handed out and ends when I say it ends. You will not be allowed extra time if you are late. If you miss the quiz completely, you will receive a zero for the quiz; microscope penalties will still be assessed. The questions will cover the procedures and results of the previous week's exercises--pay particular attention to the independent and dependent variables when appropriate. You are allowed to use your laboratory notebook (see below) but not your lab manual or your neighbor on the quizzes. Estimated total from quizzes--200 points.

**LABORATORY REPORTS (GEO 3, 4 & 5, BEO 1):** Each student is responsible for writing, and re-writing as directed, two formal lab reports in the style of scientific papers, based on lab exercises assigned by the instructor. By the time this assignment is completed, a student should have earned an estimated 150 points.

**LABORATORY NOTEBOOK (GEO 5):** Each member of a lab group should actively participate in the lab work and should keep a well organized notebook of his or her labwork (see separate handout for details). Notebooks will be collected at the beginning of lecture the day after lab meets and checked for style and completeness. Complete, well organized lab notebooks will earn an estimated total of 100 points by the end of the semester. They will also help you score well on the quizzes.

**OTHER ASSIGNMENTS:** Your instructor will periodically assign some tasks to be completed either during or outside of class. These can be based on lab exercises or lecture material. Be prepared. Your grade will be determined by how well you complete the assignment. The estimated total from miscellaneous assignments is 200 points.

**PLAGIARISM:** Be sure you read the plagiarism document available on the Biology Department webpage. Single violations will be punished with a zero for the assignment. Multiple violations could result in much more serious consequences, including a failing grade in the course and, possibly, expulsion from the University. You should also be aware that all members of the biology faculty well aware of Google and know how to use it if plagiarism is suspected. You might also want to look at [www.valdosta.edu/academic/AcademicHonestyPoliciesandProcedures.shtml](http://www.valdosta.edu/academic/AcademicHonestyPoliciesandProcedures.shtml)

**GRADING:** Your basic grade will depend on how well you do on the exams, quizzes and assignments, according to the usual percentage-based score: a score between 90% and 100% earns an A, between 80% and 90% earns a B, between 70% and 80% earns a C, between 60% and 70% earns a D, and below 60% earns an F. **THE TESTS ARE HARD. BE SURE KEEP YOUR NOTEBOOK UP TO DATE, PARTICIPATE IN CLASS, DO THE OUTSIDE ASSIGNMENTS AND OTHER HOMEWORK.**

**DROPPING A COURSE WITHOUT PENALTY:** In order to officially drop a course without penalty, a student must obtain and fill out a drop/add form from the Registrar's Office, acquire appropriate signatures, and return the completed form to the Registrar's Office before the designated date (published in the academic calendar). If you don't officially withdraw, and instead just stop coming to class, you will receive an F for the course. It will then take three A's in science classes cancel out that F and bring your GPA back up to 3.0 so you can maintain your scholarship. You will have to weigh this against the new VSU policy on withdrawals (see [www.valdosta.edu/academic/WithdrawalPolicy.shtml](http://www.valdosta.edu/academic/WithdrawalPolicy.shtml))

**SPECIAL NOTE 1:** Grades will be neither posted nor given out over the telephone.

**SPECIAL NOTE 2:** Students requesting classroom accommodations or modifications because of a documented disability should discuss this need with the instructor at the beginning of the semester. These students must contact the Access Office for Students with Disabilities located in Farber Hall. The phone numbers are 245-2498 (V/VP) and 219-1348 (TTY).

### STUDY TIPS

1. Take good notes during lecture. Then, as soon as you can after class, sit down and rewrite the notes in a logical outline. Use your book to fill in the gaps and clarify the places where the lecture did not make any sense. It also helps if you write your outline in complete sentences. Pretend we are writing an introductory biology text-book together. I am telling basically what should be in it, you are making it understandable for your peers.
2. Form small study groups and study together on a regular basis someplace without TV, stereo or other distractions.
3. Read the relevant sections of the textbook--someone spent a lot of time and energy writing the book and you spent a lot of cash buying it. As you read, think about how the material fits in with lecture. Add the material to your lecture outlines.
4. Answer the review questions at the ends of the chapters. Make sure you understand why the correct answer to the multiple choice questions is the correct answer and the other answers are not.
5. If you don't understand something ask questions, either in class or during office hours.

### DEPARTMENT OF BIOLOGY EDUCATIONAL OUTCOMES (BEO)

1. Develop and test hypotheses, collect and analyze data, and present the results and conclusions in both written and oral format used in peer-reviewed journals and at scientific meetings.
2. Describe the evolutionary process responsible for biological diversity, explain the phylogenetic relationships among the other taxa of life, and provide illustrative examples.
3. Demonstrate an understanding of the cellular basis of life.
4. Relate the structure and function of DNA/RNA to the development of form and function of the organism and to heredity
5. Interpret ecological data pertaining to the behavior of the individual organism in its natural environment; to the structure and function of populations, communities, and ecosystems; and to human impacts on these systems and the environment.

VALDOSTA STATE UNIVERSITY CORE CURRICULUM LEARNING GOALS:

Learning Goal D: Natural Sciences, Mathematics, and Technology. Students will demonstrate understanding of the physical universe and the nature of science, and they will use scientific methods and/or mathematical reasoning and concepts to solve problems.

VALDOSTA STATE UNIVERSITY GENERAL EDUCATIONAL OUTCOMES (GEO)

1. Students will demonstrate understanding of the society of the United States and its ideals. They will possess the requisite knowledge of the society of the United States, its ideals, and its functions to enable them to become informed and responsible citizens. They will understand the connections between the individual and society and the roles of social institutions. They will understand the structure and operational principles of the United States government and economic system. They will understand United States history and both the historical and present role of the United States in the world.
2. Students will demonstrate cross-cultural perspectives and knowledge of other societies. They will possess sufficient knowledge of various aspects of another culture, including the language, social and religious customs, aesthetic expression, geography, and intellectual and political history, to enable them to interact with individuals within that society from an informed perspective. They will possess an international viewpoint that will allow them to examine critically the culture of their own nation and to participate in global society.
3. Students will use computer and information technology when appropriate. They will demonstrate knowledge of computer concepts and terminology. They will possess basic working knowledge of a computer operating system. They will be able to use at least two software tools, such as word processors, spreadsheets, database management systems, or statistical packages. They will be able to find information using computer searching tools.
4. Students will express themselves clearly, logically and precisely in writing and in speaking, and they will demonstrate competence in reading and listening. They will display the ability to write coherently in standard English; to speak well; to read, to understand, and to interpret the content of written materials in various disciplines; and to listen effectively and to understand different modes of communication.
5. Students will demonstrate knowledge of scientific and mathematical principles and proficiency in laboratory practices. They will understand the basic concepts and principles underlying scientific methodology and be able to collect, analyze, and interpret data. They will learn a body of scientific knowledge and be able to judge the merits of arguments about scientific issues. They will be able to perform basic algebraic manipulations and to use fundamental algebraic concepts to solve word problems and equations. They will be able to use basic knowledge of statistics to interpret and to analyze data. They will be able to evaluate arguments based on quantitative data.
6. Students will demonstrate knowledge of diverse cultural heritages in the arts, the humanities, and the social sciences. They will develop understanding of the relationships among the visual and performing arts, literature and languages, and history and the social sciences. Students will be versed in approaches appropriate to the study of those disciplines; they will identify and respond to a variety of aesthetic experiences and engage in critical thinking about diverse issues. They will be able to identify the components of and respond to aesthetic experiences in the visual and performing arts. They will develop knowledge of world literature within its historical and cultural frameworks. They will understand modern issues within a historical context and the role of the individual in various forms of societies and governments.
7. Students will demonstrate the ability to analyze, to evaluate, and to make inferences from oral, written and visual materials. They will be skilled in inquiry, logical reasoning, and critical analysis. They will be able to acquire and evaluate relevant information, analyze arguments, synthesize facts and information, and offer logical arguments leading to creative solutions to problems.
8. Students will demonstrate knowledge of principles of ethics and their employment in the analysis and resolution of moral problems. They will recognize and understand issues in applied ethics. They will understand their own value systems in relation to other value systems. They will judge values and practices in a variety of disciplines.

SCHEDULE OF LECTURES AND LABS  
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Note: This is a best-guess syllabus. Pacing and testing dates may be changed if the need arises. Attend class regularly to keep track of changes.

WEEK 1:	-	-
Tuesday, 8-15	Introduction to biological science	pp. 2-22
Wednesday, 8-16	LAB—Lab safety; Black Box experiment	Ex. 1
Thursday, 8-17	The methods of science; basic statistics	pp. 2-22
WEEK 2:	-	-
Tuesday, 8-22	Cellular basis of life; archaea and bacteria	pp. 81-88; 528-551
Wednesday, 8-23	LAB—Introduction to the light microscope	Ex. 2
Thursday, 8-24	Eukaryote cell structure I	pp. 88-110
WEEK 3:	-	-
Tuesday, 8-29	Eukaryote cell structure II	pp. 88-110
Wednesday, 8-30	LAB—Observation of living cells	Ex. 3
Thursday, 8-31	Eukaryote cell structure III	pp. 88-110
WEEK 4:	-	-
Tuesday, 9-05	Eukaryote cell structure IV	pp. 552-572
Wednesday, 9-06	LAB--Semi-Independent microscopy project—set up	Ex. 4
<b>Thursday, 9-07</b>	<b>EXAM I</b>	-
WEEK 5:	-	-
Tuesday, 9-12	Basic chemistry—atoms, molecules, solutions	pp. 22-41
Wednesday, 9-13	LAB—Semi-independent microscopy project—data collection	Ex. 4
Thursday, 9-14	Basic chemistry—atoms, molecules, solutions	pp. 22-41
WEEK 6:	-	-
Tuesday, 9-19	Organic molecules I	pp. 41-80
Wednesday, 9-20	LAB—Cellular water relations	Ex. 5
Thursday, 9-21	Organic molecules II	pp. 41-81
WEEK 7:	-	-
Tuesday, 9-26	Organic molecules and the origin of life	pp. 75-80
Wednesday, 9-27	LAB—Protein extraction and quantification	Ex. 6
<b>Thursday, 9-28</b>	<b>EXAM II</b>	-

WEEK 8:	-	-
Tuesday, 10-03	Organic molecules and the structure of cell membranes	pp. 110-131
Wednesday, 10-04	LAB—Enzymology 1	Ex. 7
Thursday, 10-05	Energy metabolism—the basic players	pp. 150-172
WEEK 9:	-	-
Tuesday, 10-10	HOLIDAY—FALL BREAK	-
Wednesday, 10-11	LAB—Enzymology 2	Ex. 8
Thursday, 10-12	Energy metabolism—ATP synthesis	pp. 179-186; 197-202
WEEK 10:	-	-
Tuesday, 10-17	Energy metabolism—energy storage and retrieval	pp. 202-212; 172-179
Wednesday, 10-18	LAB—Photosynthesis	Ex. 9
<b>Thursday, 10-19</b>	<b>EXAM III</b>	-
WEEK 11:	-	-
Tuesday, 10-24	Gene expression	pp. 288-312
Wednesday, 10-25	LAB—DNA fingerprinting	handouts; Ex. 12
Thursday, 10-26	Controlling gene expression—bacteria	pp. 336-341, 364-367
WEEK 12:	-	-
Tuesday, 10-31	Controlling gene expression—eukaryotes	pp. 342-357, 368-379
Wednesday, 11-01	LAB—Identifying GMOs	Ex. 13
Thursday, 11-02	Controlling gene expression—eukaryotes	pp. 342-357, 368-379
WEEK 13:	-	-
Tuesday, 11-07	Cell signaling	pp. 131-149
Wednesday, 11-08	LAB—Working with plasmids-transformation	Ex. 14; Ex. 11
<b>Thursday, 11-09</b>	<b>EXAM IV</b>	-
WEEK 14:	-	-
Tuesday, 11-14	DNA replication and evolution	pp. 266-287;
Wednesday, 11-15	LAB—Eukaryotic cellular reproduction	ex. 10
Thursday, 11-16	Eukaryotic cell cycles	pp. 213-240
WEEK 15:	-	-
Tuesday, 11-21	Eukaryotic life histories and genetics I	pp. 213-266
Wednesday, 11-22	NO LABS—THANKSGIVING HOLIDAY	-
Thursday, 11-23	NO CLASS—THANKSGIVING HOLIDAY--	-
WEEK 16:	-	-
Tuesday, 11-28	Eukaryotic life histories and genetics II	pp. 240-266; 312-335
Wednesday, 11-29	LAB—Modern genetic analysis	-
<b>Thursday, 11-30</b>	<b>EXAM V</b>	-
WEEK 17: 12/05/11	-	-
12-08	FINAL EXAM—2:45 PM TO 4:45 PM	-