

Bio 101 Principles of Biology Laboratory Manual

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Fall 2016 Bio 101 Laboratory Syllabus

Week #	Dates	Lab #	Lab Title
1	9/05 – 9/8		NO scheduled labs during the first week of the semester
2	9/12 – 9/15	1	Microscopy
3	9/19 – 9/22	2	The Scientific Method and Hypothesis Testing
4	9/26 – 9/29		Nobel Conference; NO scheduled labs this week
5	10/3 – 10/6	3	Enzymes
6	10/10 – 10/13	4	Cellular Respiration and Fermentation
7	10/17 – 10/20	5	Photosynthesis
8	10/24 – 10/27		Reading Days; NO scheduled labs this week
9	10/31 – 11/03	6	Mitosis and Meiosis
10	11/07 – 11/10	7	Mendelian Genetics
11	11/14 – 11/17	8	Natural Selection
12	11/21 – 11/24		Thanksgiving Recess; NO scheduled labs this week
13	11/28 – 12/01	9	Mechanisms of Microevolution: Evolution and the Hardy-Weinberg Theorem
14	12/05 – 12/8	10	Soil Ecology: Hypothesis Testing
15	12/12 – 12/15		Last week of classes; NO scheduled labs this week

Laboratory Rules and Safety

General Laboratory Rules

1. Attend the laboratory section for which you are registered. REMEMBER YOUR SECTION NUMBER. (See ***Laboratory Absence and Make-Up Policies*** section for details)
2. Read each exercise **BEFORE** you attend the laboratory (Note: you will NOT meet for *pre-lab lectures* for this course). This will insure that you know what is on the day's agenda. Be aware that some labs have pre-lab assignments that will be due at the beginning of the period.
3. Be on time and ready to begin class activities.
4. Begin your lab work only after the instructor has made announcements and given instructions. A good policy is to take notes right in the lab manual during the lab. This will help you understand procedures, modifications, and principles.
5. All students are expected to stay for the concluding activities/discussion at the end of each laboratory session.
6. Assignments are generally due at the beginning or end of the laboratory session; work that is submitted to your instructor or teaching assistant after that time will be worth no credit.
7. Cell phones and other message devices must be turned off during lecture and laboratory sessions unless being used for calculations.
8. Please handle the microscopes carefully. Do not manipulate the microscope-mounted digital cameras unless indicated by your laboratory instructor. Notify your instructor or TA if you notice anything broken or out of place.

Laboratory Safety

1. Food and drink are **NOT** allowed in the laboratory. This includes water and chewing gum.
2. Keep your backpacks and other materials off the lab bench and the floor. Items brought into the lab should be kept in the lab bench drawers or under the tabletops along the side of the room. Only necessary lab materials (lab manual, notebook, calculator, textbook, etc.) should be on top of the bench space. Coats and other items may be kept outside of the lab. PLEASE MAKE SURE NOT TO LEAVE ANY VALUABLES UNATTENDED.
3. Closed-toed shoes must be worn at all times in the laboratory. Students wearing open-toed shoes will be asked to leave the lab and return with appropriate footwear.
4. Make note of the location of the eye wash station, fire extinguisher, fire blanket, and first aid kit.
5. Wear the necessary safety gear when appropriate. Ask your instructor what is necessary.
6. Pipetting must be done using the proper equipment.
7. Dispose of waste in the appropriate receptacle(s). If you are not sure, ask your instructor.
8. If you spill any solutions please let your instructor know immediately for proper clean up.
9. Return all solutions, equipment and materials to their original places when you and your group have completed the lab exercise(s).
10. Do not remove any equipment or materials from the laboratory.
10. Wash your hands with soap after you have completed the day's work.
11. Any incident or injuries **MUST** be reported to your lab instructor.

Laboratory Policies and Student Evaluation (Grades)

Laboratory Absence and Make-Up Policies

You **MUST** attend the lab section for which you are registered every week that the lab is in session. If you have a problem attending the section for which you are officially registered, please contact the Laboratory Coordinator, Eric Elias (eelias@gustavus.edu).

If you need to switch labs (make-up) for a week due to a prearranged activity (i.e. concert, athletic event, doctor appointment), you must make arrangements at least TWO DAYS in advance. To do so, contact the lab instructor of the section you are interested in attending to seek permission to sit in. In addition please contact your regular lab instructor to inform them of your plans.

In the event of an unexpected absence (i.e. illness, emergency), please contact your lab instructor at your **EARLIEST** convenience. All absences/switches due to unexpected problems will require verification. Verification includes doctor's note/slip from health services for illnesses, obituary card from funeral services, and so on. Please keep in mind that lab materials are removed from the lab at the end of the week to prepare for the upcoming week's lab. We may be limited in our ability to accommodate make-up requests.

Any prolonged absences or special circumstances requiring a make-up of a laboratory activity or assignment must be arranged through the lab coordinator and your instructor.

Student Evaluation (Grades)

The laboratory portion of BIO 101 is worth 100 points (approximately one-third of the total possible points for the course; check with your specific lecture instructor for details). Each of the ten labs is worth 10 points in the form of pre-lab and/or lab assignments. Most assignments are due at the beginning or end of the laboratory session; work that is submitted to your instructor or teaching assistant (TA) after that time will be worth no credit. Be prepared: read ahead in the lab manual to find out if there are pre-lab assignments due at the beginning of lab for the following week.

Survival Guide for Principles in Biology

John Lammert

"I just don't understand how I did so poorly on the exam. I read the book a couple of times and went over my notes just before the exam!"

This comment is heard all too often after an exam in Bio101. Many first-year students assume that how they studied for science classes in high school will work in college. Unfortunately, you will probably not do very well in this course if you just read the textbook and lecture notes. The exam questions will ask you to recall memorized definitions, but they will also ask you to decide on an explanation for a particular situation or to analyze data and to arrive at a conclusion or to make a prediction. Even the factual recall questions will not use the same phrases that are written in the textbook or stated by the course instructors. To do well you must develop better learning and study skills. How you mature in your learning skills during this introductory course will determine your potential success in future science courses as well as other college courses. To help you develop better study and learning skills for really learning biology, here are some tried-and-true tips.

Shortly after the lecture or lab period, take several minutes to write down (not just think about) the main theme(s) and topic(s) for class. Then later in the day or in the evening, review the highlights. If you give no further thought to what was covered in class, your short-term memory bank, where this information is first stored, will empty of what was thought, heard, or seen. The contents of your short-memory bank can be filed in your long-term memory if you review class material frequently.

A significant number of students form **study groups**. Several studies show that people who work together learn new things better, and this is reflected in grades on the exams. Find one or two other people in this course and meet on a regular schedule. Group study can reveal gaps in knowledge that you never suspected. At these get-togethers, each participant should identify what she/he does not understand. Someone else then explains and the others also contribute. The explainer will in turn gain the benefit of a stronger understanding, which leads to better retention. The textbook has good material for group study; take turns explaining concepts or key words. Thinking about and discussing what is important leads to enhanced learning. Several years ago, six first-year Gusties met regularly in a group they called "Mind Meld." They reviewed course materials and discussed important concepts. They all are physicians now.

As you work to learn the principles of biology, **try writing**. The mind can link ideas to physical movements such as drawing pictures, taking notes, making outlines. Write out the main topics of a particular topic. Prepare a flow chart to follow the development of a major concept. Some people recopy important parts of their notes in new ways within 24 hours after a lecture and report enhanced learning. Examine text illustrations, models, and computer media if available. Draw your own pictures. Knowledge lasts longer and is easier to recall if you store mental images along with words. Visualize working parts in color and motion. Use everyday experience and analogies. To make analogies, start by completing the sentence, "This is like - ." Then explore the analogy; look for features where the analogy fits and where it fails. For instance, an organism is like a machine in that it needs fuel, but it grows and machines do not.

Learning biology and other sciences requires some skills that are distinct from learning other subjects. For example, your biology textbook should be read more slowly than other books, and with pen and paper in hand. Rapid reading of the textbook will result in missing much of the included concepts, so a strategy of **scan and review** can be helpful. First, scan over a chapter to

see where things are going. Then, after you have jotted down some notes about the theme(s), reread to understand. Remember that you will most likely not grasp everything (or much at all, for that matter) after just one reading. Make notes in the margins. When you encounter a principle, a definition, or a paragraph that you just cannot grasp, write out what you do not understand. Check the index to see if what is confusing you appears in another part of the book. Or look it up in another book; sometimes seeing this bewildering concept in another context can help. The biology department library has a number of other biology texts. On the flip side, monitor the time you spend re-reading notes, simply highlighting text, and drilling with flash cards. These activities are useful in moderation, but for best learning, you need to connect your ideas into a coherent system, and use your knowledge to solve problems.

Try to "see" **how the material fits together**. Look for common biological threads among what may seem at first to be disparate facts. Isolated ideas are quickly lost, while a set of connected ideas can persist for years. Whenever you learn a new idea, learn examples of it. Reorganize your knowledge. You can improve both memory and understanding by finding new ways to organize and express your knowledge. Convert lecture notes and reading to outlines or diagrams. Condense a topic that took several class periods into a short talk to friends, study partners or parents.

If you postpone your studying until one or two days before an exam, you will fall short of what you could have accomplished had you followed a more reasonable schedule of preparation. Be ready to spend at least **six–eight hours a week studying** for this course. Keep up with the material. If your studying consists merely of reading the textbook and notes a couple of times late in the night just before an exam, you will not have learned the material and will most likely not score very well on the exam. The idea is not just to get a good grade, it is to learn.

Watch yourself at work. You may catch yourself doing things that lower your performance. Concentrate. Concentration makes studying more pleasant and vastly improves the results. If your mind wanders, analyze the source of distraction; then take care of it. Maybe you need a more comfortable study place. Make a deal with yourself: pick a specific time for study and agree with yourself that an hour's solid concentration will be rewarded by an hour of doing what you want. Stick to the agreement.

Use your curiosity. The best learning is driven by curiosity. Give yourself a room to wonder and speculate, to ask your own questions and make your own guesses.

