

**Massasoit Community College**  
**BIOL 121 Section 62 Biological Principles**  
**CRN: 20088**  
**Spring 2009**

**Instructor:** Paul C. King  
**Office:** To Be Determined  
**E-mail** Paul King (from within WebCT) - Use for majority of communications with me.  
**Office Hours:** By Appointment

**Class/Lab:** Sec. 62 Room C 320 Tuesday, 5:15-10:15 PM

**Text:** Campbell & Reece, *Biology*, 8th Ed. Pearson/Benjamin Cummings, 2008, Custom Version for Massasoit Community College. ISBN 0-536-78543-0  
(**Note:** The "Custom Version" includes only the first 21 chapters of the complete Campbell's 8<sup>th</sup> edition *Biology* text, making it less expensive than the complete text.)

**Other:** Materials Online:

- Access "Mastering Biology" at <http://www.masteringbio.com/>. Follow the directions given in the Student Access Kit provided with your textbook.

Handed out in class:

- *Get Ready for Biology*. New York: Pearson/Benjamin Cummings, 2007.

**Lab Manual:** Biological Principles Lab Manual - To download individual labs go to Campus Edition (CE ) (formally called WebCT) and click first on "Course Materials," and then on "Laboratory Materials." (Download will be necessary only if the instructor has not distributed a lab during the prior week's class.)

**Available in off-campus bookstores and at Amazon.com:**

- Griffin, R. D. *The Biology Coloring Book*. HarperCollens, 1986.
- Sackheim, G. I. *An Introduction to Chemistry for Biology Students*. 9<sup>th</sup> ed. New York: Person/Benjamin Cummings, 2007.

Note: The two books above are not required, but you might find both to be very helpful. They are available in paperback, and may be available "used" at a relatively reasonable price from Amazon.com. However, I would suggest buying *The Biology Coloring Book* new for obvious reasons. Ordering from Amazon.com is probably the most efficient way to obtain either book.

**Available in the Massasoit bookstore** (perhaps): *Chemistry for Biology*.

**Three Ring Binder:** For lab and class papers.

**Pencil:** All **lab drawings** and weekly lab reports must be done with a **pencil**. I will provide the paper for your drawings but you must provide a sharp pencil.

### **Course description:**

This course introduces basic principles of biology. Topics include the scientific method, evolution, cellular and subcellular structures, basic cell chemistry, transport across cell membranes, mitosis, meiosis, metabolism, photosynthesis, DNA structure and replication, protein synthesis and patterns of inheritance. Biological Principles is required as a prerequisite for all other four-credit biology courses.

We, as a class, will be using **team-based learning**, which is a fundamentally different approach from that used in a typical class that you may be accustomed to. You will be assigned to a 6-member team, with which you will remain and work throughout the semester. Each member of the team will contribute to the team effort to learn about and understand biology deeply, learn to work as a scientist works, and become proficient in certain basic laboratory techniques and procedures. The team, as well as you as an individual, including your effort to contribute to the team, will be held accountable.

Class: 3 hours; Laboratory: 2 hours

### **Prerequisites:**

One unit of high school science, preferably biology, and Preparing for College Reading II (Engl-092), Introductory Writing (Engl-099), and Fundamentals of Mathematics (Math-010), or waiver by placement testing results or departmental approval.

### **Who should be taking this course?**

This class concentrates on cell and molecular biology, and it serves as a prerequisite for higher-level biology courses, such as Anatomy & Physiology (BIOL 201/202) and Microbiology (BIOL 231). As a result, Biological Principles is intended for students who are interested in either (1) transferring to a four-year institution with the intent of majoring in one of the natural sciences; or (2) applying to a program (at Massasoit or elsewhere) related to a healthcare field. If you feel that you do not fall into either of these categories, and/or are interested in simply fulfilling a science elective in a career program (business administration, criminal justice, culinary arts, etc., the Department of Biology offers a variety of courses that will probably be of more interest to you, including • Survey of Biology, • the Evolution of Evolution, • Survey of Human Form and Function, • Human Genetics, • Introduction to Human Nutrition, • Introduction to Marine Biology, and • Issues in Environmental Science.

### **Course objectives:**

At the successful completion of this course you will have an understanding of the structure and functioning of the cell and the processes that are common to all living things. Key concepts are presented at the beginning of each chapter of the text. The objectives for each chapter in the text are found on the Campus Edition (CE ) (formally called WebCT) homepage under "Chapter Objectives." To access a number of helpful resources open the Student Access Kit that came with your textbook, locate the Access Code, go to "Mastering Biology" at <http://www.masteringbio.com/>, and follow the directions to register (using the

Access Code), or to sign in if you have already registered. If asked, click on your textbook, *Biology*, 8th edition (picture of Magnolia flower” on black cover – not the same cover as the book you bought).

You will also develop the following laboratory skills: lab safety procedures as outlined in the biology department guidelines, understanding of the scientific method as a problem solving technique, and use of the compound light microscope as an observational tool. Problem solving and design skills for scientific experiments will be developed.

### Procedures for evaluation of what you have learned:

At the beginning of class each week you will take both an individual and a team Readiness Assurance Test based on the text material you will have read in preparation for the class. These tests are based solely on what you have read – your having read the material **in advance** is **essential** to your doing well. There are **no make-up Readiness Assurance Tests**.

During the course there will be 3 section exams, taken individually, and at the end of the semester a comprehensive final exam, also taken individually. The final exam will evaluate in equal measure your understanding of concepts encountered **throughout** the semester. What you learn about at the beginning of the course is equally as important as concepts discussed or read about later. Note that there are **no make-up section tests**. There will also be homework, class work, quizzes, both individual and team, and lab reports. Note that there are **no make-up laboratory sessions**. You should use your notes, homework, lab reports, as well as the text and the CD supplied with the text as study guides for the section exams. An article review may be assigned during the course; if so, details will be provided.

### Grading:

1. Individual performance.....	_____ %
a. Individual Readiness Assessment Tests (min 10%)... _____ %	
b. Final Exam – Chs 1-21 (min 20%)..... _____ %	
c. Assignments.....	10%
d. Exam – Chemistry Chs 1-5.....	10%
e. Exam – Cells Chs 6-12.....	15%
f. Exam – Genetics Chs 13-18.....	15%
2. Team Performance.....	_____ %
a. Team Readiness Assessment.....	30%
b. Laboratory.....	35%
c. Case Studies/Projects.....	35%
3. Peer Evaluation.....	_____ %
Total.....	100 %

Given certain parameters within which to work, the percent values of the three major categories above will be determined by the class. The above is an example, not necessarily the final form.

Final grades will be assigned according to the following scale:

A 93.5 and above	B 83.5 to 86.4	C 73.5 to 76.4	D 63.5 to 66.4
A- 89.5 to 93.4	B- 79.5 to 83.4	C- 69.5 to 73.4	D- 59.5 to 63.4
B+ 86.5 to 89.4	C+ 76.5 to 79.4	D+ 66.5 to 69.4	F Below 59.5

Your final grade in this course is a culmination of the work you complete throughout the semester. Your grades for all course work will be accessible to you via Making the Grade (MTG), which can be accessed from CE or from my faculty web page on the Massasoit web site. You will need your Massasoit Student ID, and a four-digit PIN that I will supply. Be certain that the “V” in your Student ID is typed in uppercase; all other digits are numbers. You should use MTG to track your progress throughout the semester.

### **Attendance:**

You are expected to attend **all** class and laboratory sessions. Any absences will affect your learning, and that of your team and fellow classmates since you will not be present to participate. However, if you are absent it is your responsibility to explain to your team the reason for your absence, and to obtain missed notes, handouts and assignments. Some of the class material will be available through the CE section assigned for this course.

### **Class/discussion sessions:**

In class you will use **team-based learning** to clarify basic knowledge, and to solve problems and work through case studies. Discussion will center first within teams and then between teams. Feedback will come from both team members and the instructor.

### **Laboratory sessions:**

Team-based learning will also be used when doing laboratory exercises. The laboratory component of the course has been designed to provide you with the opportunity to study biology at the molecular and cellular levels. The exercises are also designed to allow you to investigate various biological phenomena. These exercises should result in the development of new laboratory skills and a clearer understanding of the scientific method. The laboratory exercises have been selected to illustrate and enhance the theoretical material presented in class lectures and discussions. During lab sessions you will work in team-based learning groups to complete the assignment. Working and contributing cooperatively is essential to fully benefiting from a laboratory experience. You should prepare for a laboratory session by **carefully reading** the lab handout, either given to you during the prior week’s class or downloaded by you from CE.

Most laboratory sessions will require the completion of a modified lab “report.” Lab reports often include drawings. Drawings are an important way of recording observations and are much more successful if done in **pencil**, so *please make sure that you always bring a pencil to the lab session*. The lab handouts and reports, in conjunction with your class notes, will help reinforce the concepts discussed in the class/discussion session and found in the text. The lab reports are due at the end of each lab session, unless otherwise stated.

### **Preparation outside of class:**

It is expected that you will spend a **minimum** of **10 hours** outside of class completing assigned work and preparing for the upcoming class and lab. If your schedule is such that time is an issue, you may want to rethink taking this course. Having sufficient time available is a **must**.

### **Special considerations while class is in session:**

- leaving the classroom during active class time must be kept at an absolute minimum – two planned 10–minute breaks are provided in the schedule;
- cell phones are **not to be used** - they must be **turned off** as a courtesy to your fellow classmates, me, and most importantly to prevent interrupting your learning.

### **Computers:**

You will be expected to:

- have access to a computer and be able to log onto the "web" (Note: computers are available at Massasoit.);
- have an e-mail address and be able to send and receive e-mail (Note: If you do not have a personal e-mail account Massasoit will provide one for you. Having an e-mail account, either your own or one provided by Massasoit, is an **immediate necessity**.);
- be able to log in to and use CE to:
  - download the course syllabus;
  - access course material;
  - access discussions;
  - send and receive a chat room message;
  - access, read from, and enter messages into the calendar;
  - send and receive e-mail;
  - access Making the Grade (MTG) Course Grades;
  - access biology links;
  - take weekly quizzes.

### **Students with disabilities:**

Students with disabilities who believe that they may need accommodations in the classroom are encouraged to contact a disability counselor as soon as possible. Students with learning disabilities should contact Andrea Henry (ext 1805). Students with physical disabilities should contact Mary Berg (ext 1425). Students at the Canton Campus should contact Stan Oliver (ext 2468).

### **Academic integrity (adapted from the College catalog):**

Students are responsible for maintaining the highest standards of academic honesty and integrity in this course. Violations of academic honesty will usually fall in one of two categories: cheating or plagiarism. Cheating includes, for example, copying or buying the work of others (including lab reports, homework and

online quizzes); hiring or persuading others to do work under a false name; concealing notes or other helpful materials during an exam; communicating with your classmates during an exam. Plagiarism is the use of another person's work or ideas as one's own without giving appropriate credit. In short, plagiarism is intellectual theft and is, therefore, taken seriously; consequently, using the ideas or language of others in an oral, written, technical, or artistic work must be properly acknowledged and documented. Students are responsible for understanding what constitutes plagiarism in their classes and should note that these offenses are often very easy for the instructor to catch. In this class, the penalty for cheating or plagiarism will be a grade of zero (0) for the work in question and possibly a failing grade for the course.

Please note that copying either text or drawings out of textbooks, course materials and websites is prohibited. Furthermore, unless the instructor specifically designates something as a group assignment, all homework and lab reports conducted in this course are to be yours and yours only.

### **Course outcomes:**

In accordance with the Massasoit Biological Principles Course Outcomes, by the end of this course, you should be able to:

- describe the general steps of the scientific method and use these steps in solving problems in order to understand how scientists think, to distinguish between pseudoscience and real science, and to evaluate scientific information in the popular press.
- explain why evolution is the basis for the unity and diversity observed in living things.
- demonstrate knowledge of basic chemistry including the properties of atoms, ions, chemical bonding and chemical reactions to understand biologically important molecules and processes.
- describe the role of biologically important molecules in order to understand the correlation between cell structure and function.
- distinguish between eukaryotic and prokaryotic cells, and identify and describe the structure and function of plant and animal cells and their organelles, in order to appreciate the unity and diversity of living things.
- describe the structure of the plasma membrane and relate it to its functions in diffusion, transport, metabolism, and cell-cell interactions.
- identify and explain the principles of cellular respiration and photosynthesis as they relate to energy flow through living systems.
- compare and contrast mitosis and meiosis in order to understand the process of growth, reproduction and the importance of sexual reproduction to the evolution of the species.
- demonstrate an understanding of basic concepts in inheritance in order to solve simple genetic problems and recognize common misconceptions regarding human heredity.
- describe the structure and replication of DNA and its role in protein synthesis in order to understand the chemical basis of genetics and its use in genetic engineering and biotechnology.
- follow simple laboratory protocols in order to work safely and cooperatively to complete laboratory exercises and conduct experiments using the scientific method.

- use the microscope to observe cell structure and function in order to develop good technique in preparation for more advanced courses.
- perform simple mathematical calculations and construct and interpret the results of experiments.
- apply study skills methods to the learning of biology in order to improve success in academically rigorous courses.
- strengthen Core Competencies in order to increase success in college courses and other courses in the workplace.

### **Written assignments:**

Please note that all written homework should be **word processed** (typed), not handwritten, unless otherwise instructed. However, the answers in a handout with lines provided for answers may be handwritten. It is assumed that you will use correct grammar and spelling in all required written assignments, including lab reports.

### **Missing work:**

You are responsible for completing and passing in all work at the time it is due. Except under very unusual circumstances as determined by me, late work will **not** be accepted.

### **Incorrectly recorded grades:**

Keep track of your grades through MTG. I try to be as careful as possible to make certain I accurately record your grades, but mistakes do happen. Within one week of having an assignment or exam returned promptly report any grades missing or incorrectly recorded. Adjustment will not be made at a later time. Keep all of your graded work as proof.

### **Final grades:**

Your final grade is based entirely on your work throughout the semester, and is, therefore, entirely under your control. The **effort** you put in **each and every day** could make the difference between a “D” or a “C,” a “C” or a “B,” a “B” or an “A.” The final grades stand as they are. Please do not ask to have them adjusted or changed.

### **Something to think about:**

Your ultimate success in this course depends **absolutely** on your carefully **reading** your textbook, in addition to other material assigned, **prior** to attending class. I cannot overemphasize this. You will seriously lessen your chances of doing well if you do not read and think about – **ahead of time** – the material that will be discussed in class each week. In-class activities will be used primarily to strengthen your understanding of course content.

Teams are an integral part of this course. It is your obligation to support the other members of your team, your team's obligation to support you and provide feedback, and my obligation to support both you and your team and to provide meaningful feedback.

This is **not** a memory course, although you will need to learn new terms. Emphasis is placed on your understanding of biological principles (hence the name of the course) and concepts. Your success depends upon your understanding of concepts, and your ability to work with them.

Note that the "Mastering Biology" website contains valuable exercises for each chapter in the textbook. Completing **all** of the exercises therein will be of great benefit to your understanding of concepts, and therefore to your success.

Remember, you are not alone. You attend class to work with and learn from others, including me, and to clarify concepts/ideas/terminology that may be confusing. You are encouraged to meet with me frequently, either formally or informally regarding additional help with either discussion or lab material, or regarding other concerns that may affect your being able to learn to best advantage during your educational experience. I will be glad to work with you to help you better understand concepts covered, on how to study for tests, and on any other concerns you may have relating to course material. Remember, if I don't know that you are having difficulty I will not be able to help you. I am interested in **you** and in helping **you** to learn. I am easy to talk with, so keep in contact.

# BIOLOGICAL PRINCIPLES

BIOL 121 15

Spring 2008

<u>Class on</u>	<u>Topic</u>	<u>Reading Assign*</u>	<u>Lab Exercise*</u>
Jan. 20	<b>First Class, Tues, Jan. 22</b> Intro. To Scientific Studies of Life; Evolution	CB Ch. 1 GRB Ch. 1-4 BCB Ch. 1-3; 87-90	Scientific Measurements; Magic Hooey Stick
<b>Monday, January 26, 2009 – Last Day to Drop/Add Without a Grade</b>			
Jan. 27	Chemistry Basics; Water ,	CB Ch. 2-3 GRB Ch. 5 BCB Ch. 4-13	A. Intro To Light Microscopy B. pH Lab
<b>Feb. 3</b>	<b>Classes Cancelled Due to Snow</b>		
Feb. 10	Carbon; Molecular Diversity Macromolecules	CB Ch. 4-5 BCB Ch. 13-22	Molecular Modeling
Feb. 17	<b>Exam 1 - Chs. 1-5 Topics</b> ◇ <b>Tuesday, February 10</b> Basics of the Cell	CB Ch. 6 GRB Ch. 6 (201-224) BCB Ch. 23-32; 37-42	Cell Diversity Cell Size: An Exercise in Making Models
Feb. 24	Membranes	CB Ch. 7 GRB Ch. 6 (223-245) BCB Ch. 33-36	Diffusion & Osmosis
Mar. 3	Metabolism	CB Ch. 8 BCB Ch. 43-47; 49-51	Enzymes
Mar. 10	Cellular Respiration; Harvesting Chem. Energy Photosynthesis	CB Ch. 9 BCB Ch. 48; 52-56 CB Ch. 10 (if time permits) BCB Ch. 57-58	Aerobic Respiration Ver B
Mar. 24	<b>Exam 2 - Chs. 6-10 Topics</b> ◇ <b>Tuesday, March 10</b> Cell Communication Cell Division Mitosis	CB Ch. 11 CB Ch. 12 BCB Ch. 65	Cell Cycle and Mitosis
<b>Spring Recess March 15-21 (no classes)</b>			
Mar. 31	Meiosis Sexual Life Cycles	CB Ch. 13 BCB Ch. 66-67	Meiosis

<u>Class on</u>	<u>Topic</u>	<u>Reading Assign*</u>	<u>Lab Exercise*</u>
April 7	Basic Genetics	CB Ch. 14-15 BCB Ch. 59-64; 68-72; 73-74 (use “incomplete dominance,” not “blending inheritance”); 75	Genetics Problem Set

**Saturday, April 4, 2009 – Last Day to Withdraw from A Class**

April 14	<b>Exam 3 - Chs. 11-15 Topics</b> ◇ <b>Tuesday, April 7</b> Molecular Basis of Inheritance	CB Ch. 16 BCB Ch. 76-77; 80-83	Human Variation Lab
April 21	From Gene to Protein Reg. of Gene Expression	CB Ch. 17 CB Ch. 18 BCB Ch. 84-86	Protein Synthesis
April 28	Biotechnology Genomes and Their Evolution	CB Ch. 20 CB Ch. 21 (as time permits)	Agarose Gel Electrophoresis & Strawberry DNA Extraction
May 5	<b>Last Class, Tuesday, April 28, 2009</b> Wrap-up Discussion		No Lab – <b>Final Exam</b>

**\* NOTE: The final reading assignments and laboratory exercises will be announced in class and take precedence over those indicated in the syllabus.**

**Comprehensive Final Examination Tuesday, April 28, Room C-320 (Our Classroom)**

**Note: The final examination will cover equally all of the course material indicated in the syllabus.**

**Note: The above is a working syllabus for the course, and as such, is subject to change.**

**Note: CB = Campbell’s “*Biology*”; GRB = “*Get Ready for Biology*”; BCB = “*Biol Coloring Book*”**

- The Campbell/Reece text called “***Biology***” is the one you purchased from the Massasoit bookstore. Inside the text you will find a CD containing valuable resources.
- A smaller book, called ***Get Ready for Biology***, will be handed out in class. Both of these resources will help you to better understand the text and discussion material.
- The ***Biology Coloring Book*** (1986) written by Robert D. Griffin and published by Harper/Collins is available online from Amazon.com, but may also be found at a local bookstore such as Barnes & Noble. Although it was first published in 1986 it provides a good hands-on approach to learning basic chemistry and biology concepts. It is a good supplement to your other materials, but **not** a replacement for them.

Remember, the tools, such as those mentioned above, will help only if you use them diligently. Using them takes effort, but the payoff is a solid preparation for Anatomy and Physiology, and Microbiology, and ultimately for whatever future career you may choose.  
(Revised/Used by PCK with permission from GH and WH)