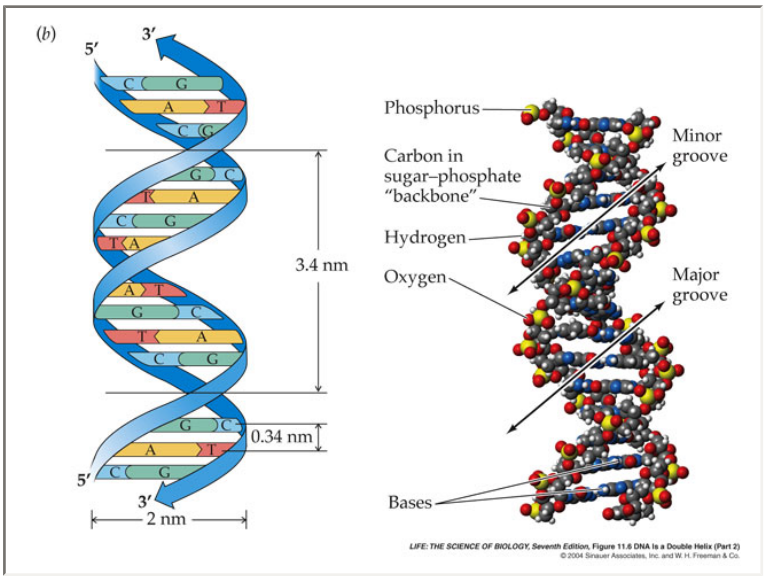
PRINCIPLES OF BIOLOGY

BIO 121 Lecture
Fall 2008



INSTRUCTOR
Alan B. Hale, Ph.D.
Office: Science Center 134
Tele & Voicemail: 610-606-4666, x3510
E-mail: abhale@cedarcrest.edu
Website: www.cedarcrest.edu/abhale
Office Hours: Open Door Policy (If my door is open, come on in.) or by appt.

COURSE WEBSITE
The Biology 121 lecture and laboratory syllabi, schedules, support staff, special events, and resources associated with this course can be found on the course website at www2.cedarcrest.edu/academic/bio/introbio/freshbio.html.

DEPARTMENTAL WEBSITE
A great deal of information about the Department of Biological Sciences is available on the departmental website: www2.cedarcrest.edu/academic/bio/ I encourage you to visit the site to learn more about the professors in the department, research programs, different courses, course requirements, normal semester sequences for different majors, science clubs, special events, photos from past events, departmental policies, and much more. In case you want to look ahead to future courses, practically all of the courses offered by the Department of Biological Sciences have syllabi posted online [www2.cedarcrest.edu/academic/bio/acad_courses.htm].

COURSE GOALS
The primary goals of the two-semester sequence of courses (BIO 121 [Dr. Hale] /BIO 122 [Dr. Faivre]) are to provide you with a strong foundation in biology so you'll be prepared to pursue further studies in science and to prepare you to function as a scientifically literate citizen within our society. We also hope that you become excited about biology so you'll be better able to make the most of your potential in the biological or chemical sciences. Some say life should be fun. I

agree. To have fun with science, you need to understand its philosophy, mechanics, and guiding principles; BIO 121 & 122 help you get started down an interesting and challenging road.

LEARNING OUTCOMES/ASSESSMENT

1. A strong foundation in the areas of cellular structure and function, energetics, Mendelian genetics, and molecular genetics so you are prepared to pursue further studies in the biological or chemical sciences.
Assessment: Three examinations and four quizzes.

2. An appreciation for how evolution, the primary paradigm within the field of biology, helps scientists understand the processes and outcomes found in the living world.
Assessment: Three examinations and four quizzes based on lectures and material in the textbook.

3. An understanding of the scientific process and how it leads to new discoveries.
Assessment: Three examinations and four quizzes.

4. An enhanced ability to use the information you have learned in terms of applications rather than mere recall of facts that you have learned.
Assessment: Three examinations and four quizzes that progress from simple recall to application.

5. A better understanding of the use of mathematics in biology
Assessment: Three examinations and several quizzes that include questions that require an understanding of probabilities and basic mathematics.

6. A greater appreciation for the role of science in our society
Assessment: Three examinations and four quizzes that include questions on material from newspapers and seminars.

COURSE CONTENT

The fall semester concentrates on cellular processes. The course begins with the chemical nature of life and then progresses into the dynamic nature of cells and cellular processes, such as as enzymatic reactions, respiration, photosynthesis and cell division. The molecular basis of gene expression - DNA, RNA and protein - is then examined to demonstrate the molecular mechanisms underlying heredity and gene function and to expand upon the cellular basis of life. We end the first semester discussing numerous connections between genome sequencing, molecular biology and medicine.

The spring semester (BIO 122) moves beyond the cellular constraints of the first semester and focuses instead on the diversity of life on Earth and how organisms maintain their existence in nature. Dr. Faivre begins with the basic principles of evolutionary theory and then moves on to the product of evolution: the vast array of life forms on our planet. The structure and function of plants and animals is then addressed. She then finishes with a segment on ecology, animal

behavior and conservation biology.

TEXTBOOK & LECTURE GRAPHICS PACKAGE

Textbook: Sadava, Heller, Orians, Purves and Hillis. 2008. Life, The Science of Biology. 8th Edition. Sinauer Associates, Inc. and W.H. Freeman and Company. Three formats are available: hard copy/hard cover (full traditional textbook; available in campus bookstore); hard copy/soft cover (separate volumes covering specific sections; available online) and an electronic version (eBook; available online through the publisher). The same textbook is used for both BIO 121 (fall semester) and BIO 122 (spring semester). If you are considering the soft-cover volumes or the eBook option, keep in mind that in BIO 121 we cover chapters 1-14. Typically, students buy the full text (hard copy/hard cover), nonetheless, the choice is yours.

Lecture Graphics Package: Graphics used during lectures have been compiled into a hard copy set of handouts. The graphics package is available in the campus bookstore. This package is made available to assist you during lectures and to enhance the quality of your notes.

The *Life, The Science of Biology* website, www.thelifewire.com/, provides a number of resources that will help you understand the material presented in this course. As noted on the website, these resources include interactive summaries, animated tutorials, activities and flashcards, interactive quizzes, online quizzes, a glossary, and two segments on math skills and survival skills.

ADVICE ON HOW TO DO WELL IN BIO 121

1. **Attend every lecture. The intent of each lecture is to help you understand and retain important concepts in biology.**
2. **Listen carefully during class. The reason for attending a lecture is to learn; use the 50 minutes effectively. If you have a habit of saying to yourself that you will learn the material some other time, you've wasted 50 minutes of your day. You'll soon discover that time is in short supply during college. Your grades will suffer because of wasted time.**
3. **What about notebooks in BIO 121? Although you should view your textbook as an excellent set of notes, taking a good set of notes during lecture will facilitate your learning of important concepts. Dr. Hale will spend most of his time translating complex concepts and processes into a more palatable form to help you understand the mechanisms of life and how scientists arrive at new discoveries. Linking your lecture notes to your readings in the textbook will help you build a strong foundation in biology. This will serve you well in upper-level biology courses, and beyond.**
4. **If you are confused about something that was said in lecture, either raise your hand to ask a question during class or jot down the question in your notebook so you can get an answer in the future from Dr. Hale, the IAs, or from your readings. Do not hesitate to ask questions during lecture; chances are others have the same question on their mind. You'll be helping yourself and others learn more about biology.**
5. **On the same day as lecture, review your notes from that day and read the section of the textbook that pertains to material that was covered in lecture. Draw pictures or write**

paragraphs in your notebook to help you understand the material better. Never underestimate the value of reading the textbook.

6. **Attend IA sessions. Arrive with questions or ask the IA to ask you questions in order to test your understanding of the material. Too often students believe they understand the material when in fact they do not. This becomes apparent when graded exams are returned to the students. It's easy to convince ourselves we can run the length of a soccer field in seven seconds, but when we're halfway down the field we may find that reality does not coincide with our original beliefs.**
7. **Compare your graded exams with the posted answer keys. Take the time to learn the material that would have helped you answer specific questions correctly. You may see similar questions on the final examination.**
8. **Avoid falling into the trap of studying only if a quiz or an examination is on the horizon. At least an hour a day should be devoted to studying material covered in BIO 121; this hour does not include lecture time. Cramming before a test does not serve you well in the long run. This will become apparent to you during finals week and during upper-level courses, which build on the concepts covered in BIO 121.**
9. **View BIO 121 as an opportunity to learn some very interesting concepts about life, rather than as one of the many courses you need to pass in order to get your degree. Life should be fun, not an endless *To Do* list.**
10. **If you're having trouble, go talk with Dr. Hale or send him an email. His primary goal at Cedar Crest is to help students succeed, so if you're convinced that the world is coming to an end or a certain biological concept makes no sense at all, stop by and see what he thinks about it.**

LECTURE ATTENDANCE

Lecture attendance is expected and represents a significant portion of your grade. One goal of lectures is to present complex concepts in a way that makes them easy to understand; hearing the material in addition to reading the text is very helpful as you begin to understand the basic principles of biology. Please keep in mind that using borrowed notes is a poor substitute for lecture attendance. During lecture, if you find any of the material confusing, feel free to raise your hand and ask a question. If confusion strikes outside of class, Dr. Hale and the Instructional Assistant are available to help you out. An attendance sheet will be distributed each lecture; it is your responsibility to sign the sheet. If for some reason the sheet bypasses you, come to the front of the room after class to sign the sheet. Attendance grades will be based solely on these attendance sheets; your grade will not be modified if you tell me at a later date that you attended a lecture but forgot to sign the sheet.

INSTRUCTIONAL ASSISTANT (IA) AND IA SESSIONS

There will be several optional, though highly recommended, weekly study sessions throughout the semester that will be conducted by the lecture Instructional Assistant (IA): Emily Hill. Specific meeting times and locations will be announced during the first week of class and will be posted on the web [www2.cedarcrest.edu/academic/bio/hale/bio121/IA.html] and on the bulletin board next to the MacLab (SC 132). You are encouraged to attend one or more of these sessions each week,

in fact you will receive one bonus point* for each session you attend *up to a maximum of two points per week*. Sessions will help you understand the lecture material more thoroughly, which will ultimately improve your performance on examinations and quizzes. The meetings with the IA will be used for at least the following activities: 1) answering your questions concerning lecture material, 2) reviewing for quizzes and examinations, 3) learning effective study habits, and 4) adapting to the college environment. If other activities would assist your learning, please do not hesitate to share your ideas with us. *Points per session will reflect the productivity of the session; 30 minutes of Q&A and discussion of concepts would be sufficient to translate into one point.

CLASSROOM PROTOCOL

Formal Campus Policy: "Appropriate classroom behavior is defined and guided by complete protection for the rights of all students and faculty to a courteous, respectful classroom environment. That environment is free from distractions such as late arrivals, early departures, inappropriate conversations and any other behaviors that might disrupt instruction and/or compromise students' access to the Cedar Crest College education." In other words, please be considerate. If for some reason you must arrive late, please close the door gently and sit in the back. By talking to your neighbor during lecture you not only miss the material being presented but you also distract and irritate others around you. Again, please be considerate; students come to learn and they deserve a distraction-free environment. Dr. Hale reserves the right to subtract an appropriate number of points from the grades of students who are not conforming to proper classroom protocol, and/or ask them to leave the classroom.

EVALUATION

Student grades will reflect attendance and performances on three examinations, including a final examination, and four quizzes. In addition, extra credit points associated with attendance at IA sessions and possibly special events announced in class will enter into the grading process. If disruptive behavior emerges within the classroom, this too will have an impact on one's final grade. Please note that students receive separate grades for BIO 121 lecture and BIO 121 laboratory.

Activity	Total Points	% of Total Grade
4 Quizzes (25 pts./ quiz)	100	20%
Examination #1	100	20%
Examination #2	100	20%
Final Examination	150	30%

Attendance (1.25 pts./class)	**50**	**10%**
Total:	**500**	**100%**
IA Session Bonus Pts.	**28 max.**	**~6%**

Conversion of Numerical Grades (%) to Letter Grades										
A	**A-**	**B+**	**B**	**B-**	**C+**	**C**	**C-**	**D+**	**D**	**F**
93-100%	**90-92.9%**	**87-89.9%**	**83-86.9%**	**80-82.9%**	**77-79.9%**	**73-76.9%**	**70-72.9%**	**67-69.9%**	**60-66.9%**	**< 60%**

Please Note: Although you do not need a grade of C- or better in BIO 121 to take BIO 122, you must have a C- or better in both BIO 121 and BIO 122 before you can enroll in upper-level biology courses, including sophomore-level courses. Keep in mind that BIO 121 is not offered during the spring semester; this means that if you plan to remain on your 4-year schedule, an equivalent to BIO 121 will need to be completed during the summer. Focusing on BIO 121 now will free you of this unplanned burden (time and money) during the summer.

Up-to-date summaries of grades will be posted online periodically throughout the semester. To access your grades, use the link entitled *Test Results & Grades*, which can be found on the course homepage. You will be asked to provide your last name and your password. Randomly selected passwords will be distributed to students when the graded Quiz #1 is returned. Passwords are confidential and should not be shared with others. Passwords are difficult to retrieve, so please do what is necessary to remember them (*e.g.*, keep your graded Quiz #1).

Missed Examinations/Quizzes

A missed examination or quiz can have a significant impact on your final grade. Consequently, it is in your best interest to be present when the examination/quiz is administered. If you are going to miss an exam/quiz, contact me before it begins. If you have a legitimate reason for being absent (*e.g.*, illness, death in the family) we will make arrangements for a make-up exam/quiz, which must be completed before the next lecture. Again, you must contact me [abhale@cedarcrest.edu or 610-606-4666 ext. 3510 (leave voicemail if I do not answer)] before the exam/quiz begins, if at all possible. As for the final exam, if you plan to set up travel arrangements (*e.g.*, airline reservations) to leave at the end of the semester, make sure your travel dates occur after your scheduled final exam dates. The Office of the Registrar prepares the final exam schedule and will post it on the web early in the semester, if not sooner.

Examination/Quiz Format

Both the examinations and quizzes will be administered within the classroom. The full lecture period (50 minutes) will be used for examinations; only a portion of the class time will be available

for quizzes. Three hours will be available for the final examination. A sample examination #1, including the answer sheet, questions, and correct answers, is posted online [http://www2.cedarcrest.edu/academic/bio/hale/bio121/exam-sample.html] to provide guidance as to the normal format of an exam. A typical quiz will consist of two essay/diagram/problem questions that will allow each student to demonstrate how well she understands the concepts and/or processes discussed in lecture and within the textbook. A sample quiz is also available at the above site. Answer sheets will be provided for both examinations and quizzes.

SPECIAL EVENTS & EXTRA CREDIT

Some special events on campus enhance your understanding of science, biology, chemistry and/or the life and times of scientists. If such an event is on the horizon I will make an announcement at the beginning of a lecture period and will note the number of extra-credit points that will be awarded, if any. I encourage all of you to attend these special events, though I do realize that you may have other commitments at the same time. An attendance sheet will be taped on the table at the back of the room where the event is being held (typically OBC 1, SC 136 or MB 33). To receive the extra credit points, please sign the sheet immediately before or after the event. *In the interest of common courtesy, please do not arrive late or leave early from the event, otherwise you will forfeit the extra-credit points. If you cannot stay for the full session, it is best if you do not attend the event; late arrivals and early departures are distracting to the speaker and audience.*

CAMPUS-WIDE POLICIES

The professors within the Department of Biological Sciences support the following campus-wide policies as described in the Student Handbook.

Honor Philosophy

"The Cedar Crest College Honor Philosophy states that students should uphold community standards for academic and social behavior in order to preserve a learning environment dedicated to personal and academic excellence. Upholding community standards is a matter of personal integrity and honor. Individuals who accept the honor or membership in the Cedar Crest College community of scholars pledge to accept responsibility for their actions in all academic and social situations and for the effect their actions may have on other members of the College community."

Community Standards for Academic Conduct

"Academic integrity and ethics remain steadfast, withstanding technological change. Cedar Crest College academic standards therefore apply to all academic work, including, but not limited to, handwritten or computer-generated documents, video or audio recordings, and telecommunications.

As a student at Cedar Crest College, each student shall:

- **Only submit work which is his/her own.**
- **Adhere to the rules of acknowledging outside sources, as defined by the instructor, never plagiarizing or misrepresenting intellectual property.**
- **Neither seek nor receive aid from another student, converse with one another when**

inappropriate, nor use materials not authorized by the instructor.

- **Follow the instructions of the professor in any academic situation or environment, including taking of examinations, laboratory procedures, the preparation of papers, properly and respectfully using College facilities and resources, including library and computing resources to ensure that these resources may be effectively shared by all members of the College community.**
- **Abide by the Cedar Crest Computer Use Policy.**
- **If a student perceives a violation of the Academic Standards, he/she will go to their instructor.**
- **If you are unable to resolve the problem with the instructor, you should go to the chair of the department. If you need further assistance after consultation with the instructor and the chair, you should see the Provost."**

Plagiarism

The following definition is from the Random House Webster's Dictionary: Plagiarize- To take and use (ideas, passages, etc.) from (another's work) representing them as one's own. "Deliberate or accidental, plagiarism is a serious academic offense and a violation of the Cedar Crest Honor Code." (Student Handbook) In this course, the first offense will result in a grade of "F" for the assignment, the second offense will result in a grade of "F" for the course and will be reported to the Provost. If you plan to challenge the charge of plagiarism, follow the procedure outlined in the Student Handbook.

Learning Disability

"Students with documented disabilities who may need academic accommodations should discuss these needs with their professors during the first two weeks of class. Students with disabilities who wish to request accommodations should contact the Advising Center."

Lecture Schedule - Fall 2008

Session	Date	Topic	Text Chapter
1	Aug 25	Introduction to BIO 121	-
2	Aug 27	The Art of Learning	-
3	Aug 29	The Scientific Process	1
	Sept 1	Labor Day Holiday	-

4	**Sept 3**	**Studying Life** **[Short Film - "Evolution"]**	**1**
5	**Sept 5**	**The Chemistry of Life**	**2**
6	**Sept 8**	**The Chemistry of Life**	**2**
7	**Sept 10**	**Macromolecules & the Origin of Life**	**3**
8	**Sept 12**	**Macromolecules & the Origin of Life**	**3**
9	**Sept 15**	**Cells: The Working Units of Life**	**4**
10	**Sept 17**	**Cells: The Working Units of Life** ***Quiz #1: Sessions 1-8***	**4**
11	**Sept 19**	**The Dynamic Cell Membrane** **[Video: "Cells - Keeping It Together: Cell Membranes"]**	**5**
12	**Sept 22**	**The Dynamic Cell Membrane**	**5**
13	**Sept 24**	**Energy, Enzymes, and Metabolism**	**6**
14	**Sept 26**	**Energy, Enzymes, and Metabolism**	**6**
15	**Sept 29**	**Pathways That Harvest Chemical Energy**	**7**
16	**Oct 1**	**Pathways That Harvest Chemical Energy**	**7**
17	**Oct 3**	**Photosynthesis: Energy from Sunlight** ***Quiz #2: Sessions 9-14***	**8**
18	**Oct 6**	**Photosynthesis: Energy from Sunlight**	**8**
19	**Oct 8**	**Chromosomes, the Cell Cycle, and Cell Division**	**9**
20	**Oct 10**	***EXAMINATION #1: Sessions 1-18***	

	Oct 13/14	**Fall Break**	**-**
21	**Oct 15**	**Chromosomes, the Cell Cycle, and Cell Division**	**9**
22	**Oct 17**	**Cancer Story: What Is Cancer?** **DVD (57 min)**	**-**
23	**Oct 20**	**Genetics: Mendel and Beyond**	**10**
24	**Oct 22**	**Genetics: Mendel and Beyond**	**10**
25	**Oct 24**	**DNA and Its Role in Heredity**	**11**
26	**Oct 27**	**DNA and Its Role in Heredity**	**11**
27	**Oct 29**	**From DNA to Protein: Genotype to Phenotype**	**12**
28	**Oct 31**	**From DNA to Protein: Genotype to Phenotype**	**12**
29	**Nov 3**	**The Genetics of Viruses and Prokaryotes** ***Quiz #3*: *Sessions 19-26***	**13**
30	**Nov 5**	**The Genetics of Viruses and Prokaryotes**	**13**
31	**Nov 7**	**The Eukaryotic Genome and Its Expression**	**14**
32	**Nov 10**	**The Eukaryotic Genome and Its Expression**	**14**
33	**Nov 12**	**Cell Signaling and Communication**	**15**
34	**Nov 14**	**Recombinant DNA and Biotechnology**	**16**
35	**Nov 17**	**Recombinant DNA and Biotechnology** ***Quiz #4*: *Sessions 27-32***	**16**
36	**Nov 19**	**Recombinant DNA and Biotechnology**	**16**

37	**Nov 21**	***EXAMINATION #2*: Sessions 19-33**	
38	**Nov 24**	**Guest Professor - Dr. Joy Karnas** ***Biotechnology & Cardiovascular Disease***	**-**
	Nov 26	**Thanksgiving Holiday**	
	Nov 28	**Thanksgiving Holiday**	
39	**Dec 1**	**The Life of a Scientist** **The Discovery of Ribozymes** **On Becoming a Scientist** **[Discovery of] RNAi's** **HHMI (~42 min)**	**-**
40	**Dec 3**	**The Art and Emotions of Science and Discoveries** **Double Helix - DVD Chapter 22 - End (~45 min)**	**-**
41	**Dec 5**	**Guest Professor - Dr. Richard Kliman** ***How Geneticists Can Find Genes for Complex Traits***	**-**
42	**Dec 8**	**Synthesis**	**1-16**
	Final Exam Period **Dec 11-15**	***FINAL EXAMINATION*** ***To Be Announced***	**Sessions** **1-42**