Biology 112N: Introduction to Organismic and Evolutionary Biology

## Fort Lewis College, Fall 2012

## Tuesday and Thursday 10:10-12:10, Berndt Hall 235

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**Why Biology?**

Some of you already know that you want to pursue a career in biology; others of you are unsure, and may be here to “test the waters,” and see what you think. Whatever your motives, I hope that you will begin to see that biologists have a particular world view, which is quite different from the view held by people in many other professions. You may already have such a view of the world; if not, I hope that this winter term you will begin to cultivate it. The biologist John Janovy, in his book *On Becoming a Biologist* (Harper & Row, 1985) discusses the distinctive world view that sets biologists apart from their peers in other disciplines:

*“We* [humans] *share a common bond with even the most bizarre beetle of the Peruvian rain forest. A belief in that common bond might, in fact, be the most fundamental characteristic of a biologist… The decision to become a biologist demands an attachment to the world of living organisms… [I]f you exercise this kind of sensitivity… on your own, you have one of the… properties of people who would be nothing other than biologists.”*

Janovy (1985; pp 2, 10, 15)

Biology is the study of life – of living things, how they work, how they interact with each other and their environment. It is the study of connections among all the intricate workings of cells, organisms, ecosystems, and the dynamic history of the earth that has allowed all of these processes to evolve.

**The Syllabus:**

This syllabus is your contract for Biology 112. It is an outline of what you may expect of me (and the course), and of my expectations of you. You will notice that the syllabus is quite long; there is a reason for this! Here I have described the goals of this course, some of the methods I will use in helping you to learn course material, and how I will assign grades this semester. The final pages of the syllabus include a week-by-week schedule of topics, reading assignments, exams and homework for the entire semester – **examine this carefully!** While it *is* subject to change, it is your responsibility to keep track of the various assignments and deadlines listed. Many of the questions you may have about the mechanics or logistics of the course are outlined here – read through the syllabus and get to know it!

**About the Course -**

**Course Objectives and Description:**

This course is designed to usher you into the Biology Major at Fort Lewis College. Therefore, I will introduce you to the fundamental principles of environmental biology and evolutionary thought. During lecture we will examine many basic paradigms of biology, such as ecology, evolution, systematics, and genetics. We will also discuss the nature of the scientific method, how biologists use the scientific method to understand the natural environment, and compare the scientific method with other ways of knowing. All of the paradigms we study will provide you with a strong foundation for a more detailed study of issues in evolution and the natural environment.

**Class Format:**

Our class meeting times will be 2 hours long (10:10-12:10 Tuesday and Thursday), and you should expect to be *in class* for the entire 2 hours every session. Every day we will take a 10 minute break mid-way through the class, so please hold off your hunger pangs, restroom needs, urgent phone calls or coffee crises for this break. We will reconvene *promptly* after the break, and usually continue with lecture begun in the first half of class or do activities related to the topic discussed earlier in lecture. These activities will be wide-ranging, including things like small group discussions, biology “games,” field outings, small-scale experiments, computer “labs,” videos, debates and other fun stuff. You will need to come to this class prepared to *get involved* and be an *active participant*.

You will also notice that we are not covering topics in exactly the order they are presented in your text. I feel that the order in which we will address topics reflects (to some extent) the logical unfolding of human curiosity and questioning of the natural world. Some of first “biologists” were people like Charles Darwin, who were fascinated with natural history. Darwin is often counted among the first ecologists, although he is most remembered for championing the theory of evolution by natural selection. Some of the questions raised by the Darwin’s theories were only answered when biologists rediscovered Gregor Mendel’s elegant studies of genetics. In turn, we cannot fully appreciate the mechanics of inheritance and genetics until we understand how cells work, what chromosomes are, and how cells divide in mitosis and meiosis. So, while most text books build from small-scale processes (cell structure & function) to larger scales (ecosystems), we will follow a path that I think you will find more logical – working from systems you can – and do – see every day, down to more and more abstract considerations.

**General Education Requirements:**

This course is a gT pathways course and will meet the **SC1 AND SC2 Content Criteria:** Lecture content shall:

·         Develop fundamental knowledge in specific field of science

·         Develop an understanding of an ability to use the scientific method

·         Recognize that science as a process involves the interplay of observation, experimentation and theory

·         Develop quantitative approaches to study natural phenomena

·         Identify and highlight interconnections between specific science courses being taught and larger areas of scientific endeavor; and

·         Distinguish among scientific, nonscientific, and pseudoscientific presentations, arguments and conclusion.

**Competencies include**: Critical thinking and Mathematics

**Course Resources -**

**Required Texts:**

* *Biology*, N. Campbell, and J. Reece *8th edition (or FLC Custom edition, volume 1),* 2008; Pearson/Benjamin Cummings, ISBN 0-8053-7146-X

**Computer Resources:**

www.campbellbiology.com – contains textbook resources

This website is a great learning resource that serves to supplement your reading of the text and class sessions including chapter reviews, a glossary of terms, and interactive activities.

Computers are available for you to use throughout the campus. There are computer labs located in Jones, Noble, Education & Business (“EBH”) and Berndt Halls, as well as the library. If you need some help in using the internet or features of the course website, you should be able to get help from lab assistants in these computer labs. If that doesn’t work, feel free to come ask me for some help

**Grades & Evaluation -**

Below are the points possible from this course, and the grading scale that will be used to determine your overall grade for Biology 112:

**Points Possible Grading**

Exams: 4 (~100 pts) 400 pts A=90-100% of total pts possible

In Class Assignments 150 pts B=80-89%

Take Home Assignments 150 pts C=70-79%

Class Participation 50 pts D=60-69%

Total points: 750 pts F=<60%

*Plus & minus final grades will be given.*

**Assignments:**

I will give you various assignments throughout the course of the semester. Due dates for these are outlined in the course schedule, **and you are responsible for turning them in on time!** Some assignments will be completed in class, but most of them will require homework. The goal of these assignments is to give you practice in working with the material, and to help you gain a better understanding of the subject matter.

**In-class activities:**

These will include individual and group activities performed during class – **attendance in class will therefore be essential for this portion of your course grade (~20%).**

**Exams:**

You will have four exams in this course, including the final exam. All of these exams will contain multiple formats (i.e. multiple choice, fill in the blank, short answer/essay). Each exam will cover approximately 3-4 weeks of material. The **final exam,** will emphasize the last two weeks of lecture material, but will also contain short essay questions that will test your ability to synthesize information from the entire course.

**Take note of the exam dates and write them down on your calendar or schedule book! A missed exam will result in zero points for you and will have a very negative impact on your grade.**

**Sample Exam Questions:**

1. *For each statement list whether the statement is associated with prokaryotic or eukaryotic cells.* a. chromosomes are located in the nucleus \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

b. membrane bound organelles are absent \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

c. this cell is the larger of the two \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Natural selection occurs at the level of a population or organism? (circle correct answer)
2. Which of the following are characteristics associated with land adaptation?
   1. multicellular gametophytes
   2. alternation of generations
   3. apical meristems
   4. multicellular dependant embryos
   5. A, B, C
   6. All of the above

4. List the different phases of mitosis and draw a picture of a cell in metaphase and identify the sister chromatids and the metaphase plate.

**Attendance Policy:**

**I** **expect that you will attend *every* class.** If you miss a class, you are responsible for learning the material covered on your own. In the event that you miss a class, make sure you acquire notes for that day from your classmates (I suggest more than one). Make-up exams will not be given without a Dean’s excuse or making prior arrangements.

**I also expect you to arrive to class *on time* and to return from breaks on time.** Coming in late to class is not just discourteous, it shows a lack of respect for your professor and your classmates, and it really disrupts a class session.

**What do I need to do to get an A in this course?:**

Based on past experience, the following list compares student knowledge and skills versus their final class grade.

**“D” students-** Are unclear about basic material. They are usually unwilling to admit this and ask for help.

**“C” students-** Know most of the basics but are short on details. Such students usually memorize the material without really understanding it. They lack the ability to create crosslinks between related pieces of information, and fail to see overall patterns in that information; this leads to difficulties in problem-solving. In the words of one C student: “the light bulb hasn’t come on yet.” In our course, “C” is an *average* grade!

**“B” students-** Know most basics and lots of details. They have good understanding in most areas but often lack confidence in their problem-solving abilities. May be reluctant to be wrong. B students perform above average in putting together concepts from the course.

**“A” students-** Know all the basics and most details. They have a global understanding of the big picture and can apply what they know to solve novel problems. They are willing to take chances and be wrong. An A student has shown *excellent* understanding of how the ideas and information in the course fit into larger frameworks.

**Tips & Practicalities -**

**Tips for success in this course:**

Introductory Biology classes will be some of the toughest classes you take at Fort Lewis College. We will cover vast amounts of information at a seemingly break-neck pace. During this course, I will challenge you to have command of detailed information and to develop an understanding of how all of these details relate to each other through general themes of biology. This means that you will be responsible for seeing and understanding both “the forest” and “the trees.”

* Read the assigned material before coming to class so that you are familiar with the material before we discuss it in class.
* Tests will be over what we cover during lecture. If you read something in your text and I did not discuss this material in class at all, this material is not likely to be on the exams. However, you will be responsible for more detailed information on subjects that I have discussed in class.
* Study for this class EVERY DAY. Biology is, in some ways, a foreign language that will take daily study and practice. The only way to keep up in this class will be to study new information as we cover it in class. Do not wait until the night before, or even the week before, an exam to study. Study in manageable bits along the way. By doing this you will be able to: *i.* avoid frantic cramming and its related test anxiety; and *ii.* be able to gradually build a body of knowledge by adding new information in small amounts.
* As you learn details, ask yourself questions: Why is this detail important? How does this detail relate to what I already know? I find that by trying to relate new details to my current understanding of a subject, I can better remember those details. This will make you think about the “big picture” and how individual details fit into it. You can be *guaranteed* that I will ask you to think about Big Picture ideas on your exams.
* Do the assignments given, and *more*. The assignments will be aimed at helping you understand what I consider to be important details and concepts in this class. Thus, by thinking through and doing the assigned problems, you are actually studying for the exams. In addition, there are plenty more problems, activities, and quizzes for you to do at the *Campbell Biology* web site, and at the end of each chapter.

**Tips for Efficient Reading:** adapted from http://www.shepherd.wvnet.edu/scwcweb/web18.htm

**I. Reading Preparation**

* Make reading part of your studying schedule. Set aside time to accomplish your reading assignment BEFORE class.
* Gather reading material and supplies (e.g., paper, pencil, highlighter).
* Find a comfortable spot to read.

**II. Reading Overview (2-3 minutes for a book, chapter, or article)**

* Review all titles and subtitles and ask yourself what information these sections contain.
* Briefly review charts and figures and try to understand how they related to the titles and subtitles.
* While reviewing your reading assignment ask yourself, “what can I learn from this?” and “how does this relate to what I am learning in class?”

**III. Read Actively**

* While reading you should use a simple shorthand scheme for taking notes.
* For example, you can underline all main points or make a parallel line in the margin for more than one sentence that has a significant/interesting point. You can make the letter “D” in the margin to note something you want to discuss. You can make a “?” in the margin for something you don’t understand or put a box around numerous sentences that you don’t understand our something you need to think more about.
* You should write down your thoughts in the margins or on a separate piece of paper.
* You should write down or mark sentences that you don’t understand.
* You should reread a paragraph before going on if you don’t understand it. If you still don’t understand it after rereading it then you should mark it so you don’t forget to clarify it later.
* Relate your reading assignment to charts and figures.

**IV. Relate your reading assignment to what you currently know regarding the subject during and after completing the reading assignment.**

**Campus Resources:**

If you find you are struggling in this course or any other courses this semester, or if you are simply having a hard time with the whole college “scene,” bear in mind that you are not alone. The first semester of your first year in college can be extremely stressful, and the first 4-6 weeks are probably the most difficult. You are making many adjustments in your personal and social lives, *as well as* embarking on a challenging academic journey.

At Fort Lewis College there are many options open to you in over-coming such obstacles. Here are some of the places you can go if you find you need help:

**First:** Admit to yourself that you *could* use some help.

**Second:** If you prefer, ask one of your professors for advice, or a recommendation of where else to go for assistance. Professors often know the names of majors in their field who are interested in tutoring.

**Third:** Try one of the many centers on campus that are here for you. Below is a partial list:

*Learning Assistance Center* 280 Noble Hall

- help with study skills

- tutoring

*Disability Services* 280 Noble Hall

[If you do have a disability that requires special accommodations, please notify me at the beginning of the course so that I can be sure to meet your needs.]

*Academic Readiness Center* 460 Berndt Hall

- outreach for 1st generation college students

*Counseling Center* 260 Noble Hall

- help dealing with extreme stress or emotional difficulties

**Scholastic Ethics:**

Academic dishonesty in any form (*i.e.* plagiarism, cheating, aiding in cheating) will not be tolerated because such dishonesty undermines the academic endeavor. Any act of academic dishonesty will result in the student earning zero points on the dishonest work, referral to the Academic Standards Committee, and possible dismissal from the College. If you are caught doing academic dishonesty in any form twice in this class you will FAIL the course and asked to no longer attend class. Students are also expected to comply with the College's Student Code of Conduct (Fort Lewis College Student Handbook, 1999, pp 5-14.).

Although you will be graded on your own work, you may wish to study and work problems together with other students. Science is a process and is usually most exciting and rewarding when done collaboratively; we all get ideas from others. If you are in doubt as to how to cite the work of others or wondering if group work on a particular assignment is okay, just ask. Remain above suspicion of dishonesty.