

Name: \_\_\_\_\_

Student #: \_\_\_\_\_

BioEng 1510; Science Without Walls; Final Exam, Spring, 2012; May 3, 2012  
Closed Book/Closed Notes

Answer all questions. Think through your answers before writing. Write legibly. Use sketches or diagrams. Write your name on each page of the exam but do not separate the pages. If you feel a question is ambiguous, describe what you think is the most reasonable interpretation and answer it. The exam is worth 100 points. You have a maximum of 2 hours. Remember, exams should be learning and thinking experiences. Relax. Enjoy!

**Turn in your Personal Lab Notebook with this exam. Be sure your name, student number, and site are on the notebook and on the exam.**

1. We discussed (in Chapter/Program 26: What is Life?) two different models of evolution: the traditional Darwinian model and the "Margulis" (and others) symbiogenesis model. Briefly define, contrast, and discuss each model. Today, most scientists believe that both models are active. Why do we say several times in this course '5 Billion Years is a VERY long time.' What does that have to do with evolution? Be as complete and specific as you can.
2. In the Chapter/Video 35, I use the terms Planetary Medicine, Planetary Pathology, and Planetary Physician. Who do these mean in the context of James Lovelock's GAIA model?
3. Compare and contrast Earth's "dynamic" atmosphere with a static, equilibrium planetary atmosphere. Is Earth an open or closed system? What about Mars? Sketch and discuss—is there a Yin-Yang principle here? Explain..
4. Using your right hand, palm up, as a guide, sketch, list, and discuss Lynn Margulis' 5 Kingdoms Model of biologic classification and evolution. Indicate the approximate sequence in evolution of each of the 5 Kingdoms.
5. There are two fundamentally different kinds of cells, prokaryotes and eukaryotes. How are they different? Discuss why many types of bacteria can 'develop' antibiotic 'resistance'.
6. We can't make new atoms or new mass—at least not in this course. Where does the mass of a tree come from? And how does that happen—what's the basic process (equation, please!)?
7. How is aerobic respiration related to combustion? Give the basic, summary chemical reaction equations for each. Explain.
8. Describe and discuss the subject of Global Warming using the greenhouse model. Sketches, please!! Be sure to include a discussion of light absorption and its role in the greenhouse effect.

9. We're hearing a lot about risk today—from financial risk to climate risk to disaster risks (earthquakes, for example). Your tolerance for or acceptance of risk is dependent on several factors, discussed in Chapter/Video 37. What are these factors or criteria? Discuss them using the recent severe weather concerns as an example.

10. Answer three of the following as completely and fully as you can:

Who was Lynn Margulis, and what did she do?

Who was Rachel Carson, and what did she do?

Who was Jacques Cousteau, and what did he do?

Who is Edward Wilson, and what does he do?

Who is James Lovelock, and what does he do?

### **TURN IN YOUR SCIENCE JOURNAL.**

Final Note:

You are now amateur scientists as well as citizens. Use your new knowledge, perspective, and critical thinking skills. **Insist on facts, data, knowledge.** Please do not believe what you read, hear, or see unless you've analyzed it and **know** that it makes sense and that the facts "add up." Challenge your friends, elected and appointed officials, and your teachers!

Read the papers and news magazines. Write letters to the editor—participate and educate. Enjoy your responsible citizenship.

Thanks for being part of Science without Walls – and continue to practice and enjoy Science in YOUR World!