Course Portfolio: **PAI130, Biology** (Spring 2015)

Instructor: Dixon, Michael

Overview:

The purpose of the course is to familiarize students with many of the basic concepts underlying the study of biology. The course is comparable to a typical introductory biology course in Western universities. In addition to teaching students the subject matter, another goal of the course is to prepare students to study overseas in English-speaking universities.

Design:

The course is designed to help students understand many of the fundamental principles of biology. The textbook is **Concepts of Biology,** by Sylvia S. Mader (McGraw-Hill International Edition). The course covers the following topics:

Overview of Biology as the Study of Life

Basic Chemistry and Cells

Organic Molecules and Cells

Structure and Function of Cells

Dynamic Activities of Cells

Photosynthesis

Cellular Respiration

Cell Division and Reproduction

Patterns of Genetic Inheritance

Biotechnology and Genomics

Darwin and Evolution

Speciation and Evolution

History and Classification of Life

Evolution of Microbial Life

Evolution of Protists

Evolution of Plants and Fungi

Evolution of Animals

Evolution of Humans

Enactment:

The textbook includes extensive explanations of all concepts involved in the course. In addition, lectures emphasize the most important concepts and explain relationships between ideas. Group discussions are occasionally used to help prepare students for the upcoming lecture.

Students' grades are based on several factors: attendance, participation in class, completion of homework, quizzes, and midterm and final exams (see the syllabus attached at the end of this portfolio) .

Most homework assignments consist of reading in the textbook and outlining major concepts. This process helps students to actively process the information, to better understand relationships among concepts, and to understand the relevance of the material to their lives.

Four quizzes are given throughout the semester (approximately every two or three weeks between exams). One purpose of the quizzes is to help students recognize which areas are causing them difficulty so they can seek additional explanation. Immediately after each quiz, the answers are reviewed in class so students can ask questions about topic they do not understand. Another purpose is to motivate students to study the concepts repeatedly over time (a key factor in retaining information). A final purpose is to prepare students for the exams, which use the same format and have many of the same questions as the quizzes.

Quizzes and exams consist mostly of fill-in-the-blank short answers or providing brief definitions of terms. I never use multiple choice examinations because they do not require students to understand concepts sufficiently. See the attached example of a final exam for the kinds of questions asked (quizzes and the midterm exam use the same format, though the quizzes are shorter).

The midterm exam covers all information from the first half of the semester. In the week after the midterm, students see the results of the exam, and we go over the answers in class (again giving students the opportunity to ask for further explanation). The final exam covers all information from the entire semester, though about 65% of questions are focused on the second half of the semester.

Results:

The course can be quite challenging for non-native English speakers. Much of the terminology can be very difficult to understand, and some concepts are quite complex and difficult to understand. Most students seem to develop a basic grasp of the major concepts; a few students each semester do quite well.

Unfortunately, because it is a difficult course, several students each semester drop the course or stop attending. However, it is not practical to make the course easier. An important purpose of the course is to prepare students to study overseas--making the course easy enough for everyone to pass would not properly prepare them for the challenges they will face.

Biology Spring 2015

Textbook: **Concepts of Biology,** by Sylvia S. Mader
(McGraw-Hill International Edition)

Grading:

Quizzes	30 %
Midterm Exam	25 %
Final Exam	25 %.
Attendance and Participation	20 %
Total	100 %

Homework:

Homework will consist of reading and outlining material in your textbook.

Quizzes:

Quizzes will be given every other week. Each quiz will test for the material covered since the previous quiz.

Midterm and Final Exams:

There will be two exams during the semester. Each exam will be worth 25% of your final score. Cheating on an exam will result in **failure** of the entire course.

Absences & Lateness:

For each hour that you are absent, you lose one point from your final score. You also lose any points for quizzes or exams in that class. An absence may be excused if you have written proof that you could not attend class (e.g. note from your doctor). Notes must be given to me the class after you are absent **(not** at the end of the semester).

Other:

Do not use your phone in class for calls or text messages! If you use your phone during class, you will lose points.

If you need to use the bathroom, please leave and return to the room quietly. Do not take too long.

Contacting me:

Mike Dixon
Office: D577
Email: dixonpufs@yahoo.com
Office hours: Tuesday 2 p.m. to 3 p.m.; Wednesday noon to 1 p.m. and
2 p.m. to 3 p.m.; also by appointment.

If you wish to meet with me outside of class, please set up an appointment.

Student ID:_____ Korean name:_____ Nickname:_____ Class ID:_____

Biology Final Exam Spring 2015 section: _____

1. A good hypothesis can be _____, and it can be _____.

2. _____ groups determine the activity of an organic molecule. Some groups are _____ (not soluble in water), and some are _____ .

3. Proteins are made from _____ monomers.

4. _____ stores genetic information, and _____ carries information to direct protein synthesis.

5. _____ is the basic unit of life.

6. _____ have a nucleus; _____ don't have a nucleus.

7. _____ are structures within cells that perform specific functions.

8. Animal cells are joined together by three kinds of junctions: _____, _____, and _____ junctions.

9. Active transport requires a _____ protein and _____.

10._____ is the chemical that absorbs solar energy to energize electrons.

11. In addition to light, photosynthesis requires _____ and _____ .

12. In cellular respiration, most ATP are built in organelles called _____ .

13. _____ is the breakdown of glucose to two molecules of pyruvate.

14. Fermentation produces carbon dioxide and _____ or _____.

15. Prokaryotes reproduce by _____, splitting in two.

16. _____ are the two of each kind of chromosome, one from each parent.

17. During meiosis I, chromosomes can exchange genetic material in a process called _____ . This process and sexual reproduction both increase _____ .

18. A _____ allele can mask the expression of a _____ allele.

19. If an organism has two of the same kind of allele, it is _____.

20. _____ is when two different alleles of a gene are both fully expressed.

21. The primary source of genetic change among prokaryotes is _____.

22. _____ structures are anatomically similar structures that evolved from a common ancestor; _____ structures have similar functions, but they evolved from different sources.

23. Natural selection has three basic effects. In _____ selection, two or more extreme phenotypes are favored over any intermediate phenotypes. In _____ selection, the range of phenotypes is reduced. In _____ selection, an extreme phenotype is favored.

24. The acquisition of similar characters in distantly-related lines of descent is _____ .

25. The geologic timescale is divided into three _____, and each of these is divided into _____.

26. Over millions of years, the earth's major land masses change positions; this is called _____ .

27. When a large number of species disappear in a relatively short time, it's called a _____.

28. _____ are traits that distinguish between different species.

29. All viruses have an outer, protein covering called _____; some also have an additional membrane covering called _____.

30. Bacteriophages have two kinds of life cycles: _____, in which viral reproduction is delayed, and _____.

31. Two symptoms of viral infection in plants are _____ and _____.

32. _____ is the production of the different components needed to make more copies of a virus.

33. A _____ makes a DNA copy of its RNA genome using the enzyme _____.

34. _____ was probably the first macromolecule.

35. Some prokaryotes are _____ (they produce their own organic nutrients), and some are _____ (they take in organic nutrients from other sources).

36. _____, or decomposers, release enzymes that break down large organic molecules.

37. _____ were formerly called "blue-green algae," but are actually prokaryotes.

38. Methanogens, thermoacidophiles, and halophiles are types of _____.

39. Protozoans have different means of locomotion. _____ use flagella, _____ use pseudopods, and_____ use small "hairs" that move in a coordinated way.

40. Plants probably evolved from _____, a kind of photosynthetic protist.

41. Plants have four innovations that help them thrive on land. The first is protected embryos. The others are _____, _____, and _____.

42. Plants have _____ life cycle; animals have _____ life cycle.

43. Bryophytes are the only type of plants in which the gametophyte is dominant. The sporophyte is dominant in the other three types: _____, _____, and _____.

44. Sporophyte dominance is adaptive to _____.

45. Some fungi form _____ relationships with algae and plants.

46. The traditional animal evolutionary tree is based on 7 innovations, such as a body cavity and a coelom. What are 4 of the other 5 innovations? _____, _____, _____, and _____.

47. Planarians, tapeworms, and flukes are examples of _____. They are bilaterally symmetrical and have three germ layers: _____, _____, and _____.

48. Two advantages of a coelom are _____ and _____.

49. Insects, crustaceans, and arachnids are examples of _____.

50. Which two vertebrate features evolved among fishes? _____ and _____.

51. Monotremes are mammals that lay amniotic eggs. Which other two groups of vertebrates also lay amniotic eggs? _____ and _____.

52. Animals that produce heat internally are _____.

53. Two chief characteristics of mammals are _____, which provides insulation against heat loss, and _____, which produce milk for feeding young.

54. Most primates, but not humans, are adapted to _____.

55. What are three of the four common features shared by primates? _____, _____, and _____.

56. Hominids and apes split apart from a common ancestor about _____ million years ago.

57. What key feature distinguishes hominids from apes? _____.

58. Which group of early hominids, evident in the fossil record from about 4 mya to 1 mya, had small brains and were about 100 to 115 cm tall? _____.

59. *Homo habilis* was the first known hominid to show evidence of _____.

60. Modern humans belong to the species _____.