UC 12291 13S

CBM003 ADD/CHANGE FORM

☐ Undergraduate Council ☐ New Course ☒ Course Change Core Category: <u>Life/Phys Sci</u> Effective Fall ~~2013~~ 2014	**or**	Graduate/Professional Studies Council ☐ New Course ☐ Course Change Effective Fall <u>2013</u>

APPROVED SEP - 4 2013

1. Department: <u>BIOL/BCHS</u> College: <u>NSM</u>

2. Faculty Contact Person: <u>L. Williams</u> Telephone: <u>3-2637</u> Email: <u>lrwilliams@uh.edu</u>

3. Course Information on New/Revised course:
   - Instructional Area / Course Number / Long Course Title:
     <u>BIOL</u> / <u>1310</u> / <u>General Biology I</u>

   RECEIVED APR - 4 2013

   - Instructional Area / Course Number / Short Course Title (30 characters max.)
     <u>BIOL</u> / <u>1310</u> / <u>GENERAL BIOLOGY I</u>

   - SCH: <u>3</u> Level: <u>FR</u> CIP Code: / ____ Lect Hrs: <u>3</u> Lab Hrs: <u>0</u>
     26.0101.0002

4. Justification for adding/changing course: **To meet core curriculum requirements**

5. Was the proposed/revised course previously offered as a special topics course? ☐ Yes ☒ No
   If Yes, please complete:
   - Instructional Area / Course Number / Long Course Title:
     ____ / ____ / ____

   - Course ID: ____ Effective Date (currently active row): ____

6. Authorized Degree Program(s): ____
   - Does this course affect major/minor requirements in the College/Department? ☐ Yes ☒ No
   - Does this course affect major/minor requirements in other Colleges/Departments? ☐ Yes ☒ No
   - Can the course be repeated for credit? ☐ Yes ☒ No (if yes, include in course description)

7. Grade Option: <u>Letter</u> Instruction Type: <u>Lect</u> (Note: Lect/Lab info. must match item 3, above.)

8. If this form involves a change to an existing course, please obtain the following information from
   the course inventory: Instructional Area / Course Number / Long Course Title
   ____ / ____ / ____

   - Course ID: ____ Effective Date (currently active row): ____

9. Proposed Catalog Description: (If there are no prerequisites, type in "none".)
   Prerequisite: MATH 1310 or 1311. Designed for nonscience majors; does not satisfy requirements for
   biology majors and preprofessional students. Credit may not be received for both BIOL 1361:1362 &
10. 1310:1320. Introduction to general principles of biology with special orientation toward man and the____
    natural world.
    Print/Type Name: ____

- Created on 3/29/13 11:30 PM -

REQUEST FOR COURSES IN THE CORE CURRICULUM

Originating Department or College: Biology and Biochemistry
Person Making Request: Lawrence R. Williams   Telephone: 713-743-2637
                                                     Email: lrwilliams@uh.edu
Dean's Signature: _____   Date: Click here to enter text.

Course Number and Title: BIOL 1310; General Biology
Please attach in separate documents:
> X Completed CBM003 Add/Change Form with Catalog Description
> X Syllabus

List the student learning outcomes for the course (Statements of what students will know and be able to do as a result of taking this course. See appended hints for constructing these statements):

1. Explain the methods of science and their application using experiments, data, reasoning, and logic as opposed to opinion.

2. Know the four basic organic molecule groups and their functions in cells.

3. Name the component structures of cells and their functions.

4. Explain the processes of cellular metabolism: photosynthesis and cellular respiration.

5. Comprehend simple inheritance patterns and demonstrate the ability to predict outcomes of matings.

6. Comprehend the structure and function of DNA and it's role in inheritance and the production of proteins.

7. List and explain main uses of biotechnology and formulate an opinion of the role of biotechnology in modern society.

8. Explain evolutionary theory expressing an understanding of its historical development, population genetics, species concept and modes of speciation, and the body of evidence supporting evolution.

9. Evaluate the strength of the evidence supporting evolutionary theory against weaknesses.

Component Area for which the course is being proposed (check one):

*Note: If you check the Component Area Option, you would need to also check a Foundational Component Area.

☐ Communication   ☐ American History

☐ Mathematics   ☐ Government/Political

Science

☐ Language, Philosophy, & Culture   ☐ Social & Behavioral Science

☐ Creative Arts   ☐ Component Area Option

X Life & Physical Sciences

Competency areas addressed by the course (refer to appended chart for competencies that are required and optional in each component area):

X Critical Thinking   X Teamwork

X Communication Skills   ☐ Social Responsibility

X Empirical & Quantitative Skills   ☐ Personal Responsibility

Because we will be assessing student learning outcomes across multiple core courses, assessments assigned in your course must include assessments of the core competencies. For each competency checked above, indicated the specific course assignment(s) which, when completed by students, will provide evidence of the competency. Provide detailed information, such as copies of the paper or project assignment, copies of individual test items, etc. A single assignment may be used to provide data for multiple competencies.

Critical Thinking:

Students are required to comprehend what are sometimes two or more seemingly isolated facts, draw and understanding of their relation then answer questions. Additional cases will require comprehending a set of circumstances then relating them to draw a conclusion.

CLASSROOM EXAMPLES (using clicker questions):

Various clicker questions similar to those in the homework and exam examples are presented in class during lecture time. Please see below. Additionally, students are asked "follow-up" questions. Such questions probe why answers are wrong in an effort to stimulate thoughtful consideration of the process of determining correct answers.

EXAMPLE:

How may a population evolve faster than another?

a. One population has greater genetic variability;
b. One population is subjected to greater selective pressure;
c. One population is sexually dimorphic;
d. A and b;
e. A, b, and c.

The answer is C. Students must critically assess what factors influence change in gene frequency (evolution). Calculations using the Hardy-Weinberg equation show that as genetic variation decreases, so does the effect of selection. Higher selective pressure translates into more severe differential mortality and reproductive success. However, sexual dimorphism is the result of selection, not a strong driving force in selection although differences between males and females may determine selective mating frequencies. Careful thought and consideration of the three choices requires evaluating the factors as either driving evolution or being the result of evolution.

HOMEWORK EXAMPLES (using publishers' program packet):

1) When hot, many mammals sweat to control their body temperature. Evaporation plays an important role, but the direct effect is due to _____.

When hot, many mammals sweat to control their body temperature. Evaporation plays an important role, but the direct effect is due to _____.

◯ the release of heat by the formation of hydrogen bonds

◯ the absorption of heat by the breaking of hydrogen bonds

○ water's changes in density as it condenses

○ water's ability to dissolve molecules in the air

SubmitHintsMy AnswersGive UpReview Part

Relationship of temperature homeostasis to chemical properties of water the effect evaporative cooling.

2) The pH of human blood is maintained at around pH 7.4. Why does a buffer system need to be present in blood to protect against changes in pH due to increases in acids?

The pH of human blood is maintained at around pH 7.4. Why does a buffer system need to be present in blood to protect against changes in pH due to increases in acids?

○ Under normal conditions, only acids need to be buffered.

○ Adding bases doesn't alter the pH of most solutions significantly.

○ Our blood is not exposed to any bases.

○ The metabolic processes of the body produce more acids than bases.

SubmitHintsMy AnswersGive UpReview Part

Permits student to use information learned from acid/base understanding to extending that information into comprehension of how buffer systems function in general, but specifically the importance of buffer systems in living things.

3) Researchers studying the effects of toxic wastes knew that animals were poisoned by the heavy metal cadmium, but they wanted to know where cadmium accumulated in the body. They could find out by _____.

○ tracing the movement of cadmium isotopes in test animals

○ measuring the size of cadmium atoms

○ finding out whether cadmium atoms form ionic or covalent bonds

○ finding out whether cadmium is acidic in water

SubmitHintsMy AnswersGive UpReview Part

Student must determine the appropriate methodology for getting data to find an answers.

4) You cross two fruit trees. One tree produces lemons with spiky leaves. The other produces limes with smooth leaves. Your F_1 generation produces lemons with smooth leaves and spiky leaves. What are the genotypes of the parents? L = lemons; l = limes; S = smooth leaf; s = spiky leaf.

○ *LlSs* and *LlSs*

○ *LLss* and *llSs*

○ *LLSs* and *LLss*

○ *Llss* and *llSs*

SubmitHintsMy AnswersGive UpReview Part

Students must understand the relationship of allele to genotype and genotype to production of gametes to find the correct answer.

5) Imagine you're counseling a couple who have undergone carrier screening for Tay-Sachs disease. The man is a carrier, and the woman does not carry the Tay-Sachs allele. How should you advise them?

○ They should be informed that if they have a child, the child will not have Tay-Sachs disease but will have a 50% chance of being a carrier of the Tay-Sachs allele.

○ They should be informed that if they have a child, there is a 50% chance that the child will have Tay-Sachs disease.

○ They should be informed that if they have a child, there is a 25% chance that the child will have Tay-Sachs disease.

○ They should be informed that if they conceive a child, the child will have Tay-Sachs disease.

SubmitHintsMy AnswersGive UpReview Part

Requires student to understand inheritance of a single-gene recessive trait, determine parental genotypes, then calculate the probability of a certain outcome.

6) There are over 100 alleles known for the gene associated with cystic fibrosis. With current technology, it is possible to determine exactly which allele or alleles is/are carried by a person. What is the maximum number of different alleles that any person can carry?

○ as many as there are alleles of the gene (~100 in this case)

○ 2

○ 1

○ 16

SubmitHintsMy AnswersGive UpReview Part

Although deceptively simple, this question poses the fact that great genetic variation exists for a single gene although diploid organisms (in this case humans) can only carry two alleles at a time. This is a consideration easily overlooked.

7) A dog breeder wishes to develop a breed that does not bark. She starts with a diverse mixture of dogs. Generation after generation, she allows only the quietest dogs to breed. After 30 years of work she has a new breed of dog with interesting traits, but on average, the dogs still bark at about the same rate as other dog breeds. Which of the following would be a logical explanation for her failure?

○ The selection was artificial, not natural, so it did not produce evolutionary change.

○ There was no selection (differential reproductive success) related to barking behavior.

○ The tendency to bark is not a heritable trait.

○ There is no variation for the trait (barking).

SubmitMy AnswersGive Up

Students must understand and differentiate the concepts of selection, genetic variability, heritability of traits, and reproductive success to determine the answer.

8) Desert pupfish live in springs of the American Southwest. Today there are about 30 species of pupfish, but they all evolved from a common Pleistocene ancestor. The southwestern United States was once much wetter than it is now, and the Pleistocene pupfish flourished over a wide geographic area. Over thousands of years, however, the Sierra Nevada Mountain range was pushed upward by geological forces, blocking rainfall from the Pacific Ocean. As the large lakes dried up, small groups of pupfish remained in springs and pools fed by groundwater seepage. Now, although many of these small springs still have pupfish, each population has evolved to become very different from pupfish in other springs.

The variation in gene pools between the 30 pupfish populations occurred through an evolutionary mechanism called

○ random mating.

○ the bottleneck effect.

○ directional selection.

○ the Hardy-Weinberg equilibrium.

SubmitMy AnswersGive Up

Students use understand the modes of speciation, definition of demes, reproductive isolation, and different types of selection to determine the answer.

EXAM EXAMPLES (using publisher's text bank):

1) The body uses atoms in different ways to accomplish different tasks. For example, one portion of the body's calcium supply strengthens bones, whereas another portion combines with proteins to stimulate blood clotting after tissue injury. Which of the statements that follow provides the most logical chemical explanation of calcium's ability to perform such different functions?
A) The bone contains calcium salts, which are less reactive than the calcium ions found in the blood.
B) The calcium in blood is a more reactive form of the atom and therefore has fewer protons than the calcium in bone.
C) There are many different isotopes of calcium, and the most reactive isotope is found in the bone.
D) The calcium in blood has a lighter atomic mass than the calcium in bone and is in a more reactive form.
Answer: A
Topic: 2.7
Skill: Synthesis/Evaluation

Student must take the different properties of calcium bound in an inorganic salt versus as an ion in an organic molecule.

2) The teeth of grain-eating animals (such as horses) are usually broad and ridged. This makes the teeth suitable for grinding and chewing. Meat-eating animals (such as lions) have pointed teeth that are good for puncturing and ripping flesh. This illustrates
A) a result of natural selection only.
B) the connection between form and function only.
C) a food web.
D) a result of natural selection as well as the connection between form and function.
Answer: D
Topic: 1.7
Skill: Application/Analysis

Student must understand the relationship between the evolutionary force of natural selection and modifications the environment may impose on organisms if genetic variation is present.

3) A cell is exposed to a substance that prevents it from dividing. The cell becomes larger and larger. This situation

A) should present no problem to the cell, since it can continue to perform all other necessary functions.
B) should present no problem to the cell, because the surface area of the cell will increase as the volume of the cell increases.
C) will eventually be problematic, since the cell's ability to absorb nutrients through its outer membrane will not keep increasing as quickly as its cytoplasmic needs.
D) should be beneficial, since the cell will be able to divert the ATP normally used for cell division to other processes.
Answer: C
Topic: 4.2
Skill: Application/Analysis

Student must understand the relationship between surface area and volume which influences the ability of cells to satisfy metabolic requirements as size increases.

4) In the lab, you use a special balloon that is permeable to water, but not sucrose, to make an "artificial cell." The balloon is filled with a solution of 20% sucrose and 80% water and is immersed in a beaker containing a solution of 40% sucrose and 60% water. Which of the following will occur?
A) Water will leave the balloon.
B) Water will enter the balloon.
C) Sucrose will leave the balloon.
D) Sucrose will enter the balloon.
Answer: A
Topic: 5.4
Skill: Application/Analysis

Student must understand the principles of solutions (solute and solvent), turgor pressure, concentration gradients, permeability, and osmosis to determine the outcome.

5) A drug is tested in the laboratory and is found to create holes in both mitochondrial membranes. Scientists suspect that the drug will be harmful to human cells because it will inhibit
A) the citric acid cycle.
B) oxidative phosphorylation.
C) glycolysis.
D) the citric acid cycle and oxidative phosphorylation.
Answer: D
Topic: 6.6
Skill: Application/Analysis

Student must take knowledge of the structures involved in cellular respiration and their functions to determine the effect of the failure of the membranes' functions.

You're the manager of a factory that produces enzyme-washed blue jeans (the enzymes lighten

the color of the denim, giving a "faded" appearance). When the most recent batch of fabric came out of the enzyme wash, however, the color wasn't light enough to meet your standards. Your quality control laboratory wants to do some tests to determine why the wash enzymes didn't perform as expected.

6) Which hypothesis is most likely to be productive for their initial investigation?
A) The nucleotide chain of the enzymes may be incorrectly formed.
B) The dye in the fabric may have hydrolyzed the fatty acids in the enzymes.
C) The three-dimensional structure of the proteins may have been altered.
D) There may not have been enough phospholipids for the volume of fabric.
Answer: C
Topic: 3.12
Skill: Application/Analysis

7) Based on your understanding of enzyme structure, which of the following would you recommend that they also investigate?
A) the temperature of the liquid in the washing vat
B) the manufacturer of the fabric
C) how long the fabric has been in storage
D) the primary structure of the enzyme
Answer: A
Topic: 3.12
Skill: Application/Analysis

Student must comprehend the relationship between protein (in this case specifically an enzyme) structure and function as well as factors that influence changes in structure.

Mr. and Mrs. Smith have three sons in elementary school. Two of their children are progressing normally, but their last son, Charles, has been much slower than his siblings at developing speech and language skills. His parents are concerned that he has a learning disability and decide to investigate further. Since some learning disabilities can be genetically based, their pediatrician recommends a chromosomal analysis.

The results show that Charles has a trisomy of the sex chromosomes, diagnosed as XYY, which is caused by nondisjunction in the formation of the father's sperm. The nondisjunction resulted in an extra copy of the Y chromosome. The extra copy was passed on to Charles during fertilization. Most often, this chromosomal change causes no unusual physical features or medical problems, but those with trisomy of the sex chromosomes do have a higher than normal risk of delays in learning development.

8) During which stage of meiosis could this nondisjunction have occurred?
A) telophase I
B) prophase I
C) anaphase II

D) telophase II
Answer: C
Topic: 8.13, 8.20, 8.21
Skill: Application/Analysis

9) If Charles gets married and starts a family, which of the following chromosomal abnormalities might be found in his children?
A) XY
B) XX
C) XO
D) XXY
Answer: D
Topic: 8.13, 8.20, 8.21
Skill: Application/Analysis

This example requires integration of knowledge of chromosomal activity during meiosis, differences between autosomes and sex chromosomes, sex determination, trisomy and monosomy, fertilization, and the difference in nondisjuction during either meiosis I or II to answer the questions.

Communication Skills:
CLASSROOM EXAMPLES (using clicker questions):

1. Students will answer clicker questions individually. The results of their answers will be recorded but students will not know whether they were correct. The same clicker question will be posed a second time and students will be permitted to discuss the question with a partner (think-pair-share) and answer a second time. Such communications permit students to analyze material and argue their viewpoint.
2. Students will work together at times to develop concept maps. Such diagrams permitted the logical development of subtopics in relation to a general theme. Such organized materials give a visual aspect to the organization of a topic. Again, students must argue and discuss the logic and development of the pattern of the map.

HOMEWORK EXAMPLE :

Students will be required to write two (2) summaries, each two (2) pages long with citations on a topic of controversy related to lecture material. Each assignment will be graded on clarity of argument, grammar, use of citations, and citation clarity.

Empirical & Quantitative Skills:

CLASSROOM EXAMPLES (using clicker questions):

Various clicker questions similar to those in the homework and exam examples are presented in class during lecture time. Please see below.

HOMEWORK EXAMPLES (using publishers' program packet):

1) Chemistry Review - Reactions & Equilibrium: Stoichiometry (Student view a turorial)

Then answer the questions.

What is the molecular mass of caffeine ($C_8H_{10}N_4O_2$)?

◯ 178.2

◯ 194.2

◯ 43.0

◯ 138.2

◯ None of the above.

Submit My Answers   Give Up

Students must use the periodic table properly to find the answer.

2) Mendel was a meticulous experimentalist. One set of crosses he performed to test his idea that a pair of hereditary determinants segregated into gametes was to allow self-fertilization of F_2 individuals to produce F_3 offspring. What proportion of the *purple-flowered* F_2 individuals did Mendel predict to be true-breeding?

○ 1/3

○ 1/2

○ 1/16

○ 1/4

SubmitHintsMy AnswersGive UpReview Part

Students must understand the Principle of Segregation and some probability laws to determine the answer.

3) Imagine you're counseling a couple who have undergone carrier screening for Tay-Sachs disease. The man is a carrier, and the woman does not carry the Tay-Sachs allele. How should you advise them?

○ They should be informed that if they have a child, the child will not have Tay-Sachs disease but will have a 50% chance of being a carrier of the Tay-Sachs allele.

○ They should be informed that if they have a child, there is a 50% chance that the child will have Tay-Sachs disease.

○ They should be informed that if they have a child, there is a 25% chance that the child will have Tay-Sachs disease.

⊙ They should be informed that if they conceive a child, the child will have Tay-Sachs disease.

SubmitHintsMy AnswersGive UpReview Part

Requires student to understand inheritance of a single-gene recessive trait, determine parental genotypes, then calculate the probability of a certain outcome.

4) Vitamin D - resistant rickets is an X-linked dominant bone disorder. A man with this form of rickets marries a normal woman. What proportion of the couple's daughters is expected to have vitamin D - resistant rickets?

⊙ 25%

⊙ 0%

⊙ 100%

⊙ 50%

SubmitHintsMy AnswersGive UpReview Part

Incorporates a sex-linked trait that requires very different use of probabilities when calculating outcomes because gender is already incorporated into the calculation and varies with gender.

5) The recessive allele of a gene causes cystic fibrosis. For this gene among Caucasians, $p = 0.98$. If a Caucasian population is in Hardy-Weinberg equilibrium with respect to this gene, what proportion of babies is born homozygous recessive, and therefore suffers cystic fibrosis?

⊙ 0.02

⊙ $0.02^2 = 0.0004$

⊙ $0.98^2 = 0.9604$

⊙ $2(0.02 \times 0.98) = 0.0392$

SubmitMy AnswersGive Up

Students must understand the Hardy-Weinberg equation and use it to calculate the answer.

6) In a large population of randomly breeding individuals, the frequency of a recessive allele is initially 0.3. There is no migration and no selection. Humans enter this ecosystem and selectively hunt individuals showing the dominant trait. When the gene frequency is reexamined at the end of the year, _____.

○ the frequency of the homozygous dominants will go down, the frequency of the heterozygous genotype will go up, and the frequency of the homozygous recessives will remain the same

○ the frequency of the homozygous dominants will go down, the frequency of the heterozygous genotype will remain the same, and the frequency of the homozygous recessives will go up

○ the frequency of the homozygous dominants will go up, the frequency of the heterozygous genotype will go down, and the frequency of the homozygous recessives will go up

○ the frequency of the individuals who express the dominant phenotype will go down, and the frequency of homozygous recessive individuals will go up

SubmitHintsMy AnswersGive UpReview Part

Student must understand the principles and assumptions associated with the Hardy-Weinberg equation, the algebraic manipulation of the equation, and how violations of assumption may influence the subsequent gene frequencies although no numerical calculations are involved in this example (they could be).

EXAM EXAMPLES (using publisher's text bank):

1) Compared to a solution of pH 3, a solution of pH 1 is

A) 100 times more acidic.
B) 10 times more acidic.
C) 10 times more basic.
D) 100 times more basic.
Answer: A
Topic: 2.14
Skill: Knowledge/Comprehension

Student must understand the quantitative relationship between a linear numerical scale and it's representation of a base 10 (logarithmic) scale.

2) A steer must eat at least 100 pounds of grain to gain less than 10 pounds of muscle tissue. This illustrates
A) the first law of thermodynamics.
B) the second law of thermodynamics.
C) that some energy is destroyed in every energy conversion.
D) that energy transformations are typically 100% efficient.
Answer: B
Topic: 5.10
Skill: Application/Analysis

Student must comprehend the idea of percent efficiency related to the laws of thermodynamics.

3) A child is brought to the hospital with a fever of 107°F. Doctors immediately order an ice bath to lower the child's temperature. Which of the following statements offers the most logical explanation for this action?
A) Elevated body temperature will increase reaction rates in the child's cells and overload the limited number of enzymes found in the cell.
B) Elevated body temperatures may denature enzymes. This would interfere with the cell's abilities to catalyze various reactions.
C) Elevated body temperatures will increase the energy of activation needed to start various chemical reactions in the body. This will interfere with the ability of enzymes to catalyze vital chemical reactions.
D) Elevated body temperatures cause molecules to vibrate more quickly and prevent enzymes from easily attaching to reactants. This would slow vital body reactions.
Answer: B
Topic: 5.14
Skill: Application/Analysis

Fever is an experience all students will relate to. This case requires using principles learned about protein structure, enzyme function, metabolic rates, and temperature and their influences during fever.

Americans spend up to $100 billion annually for bottled water (41 billion gallons). The only beverages with higher sales are carbonated soft drinks. Recent news stories have highlighted the fact that most bottled water comes from municipal water supplies (the same source as your tap water), although it may undergo an extra purification step called reverse osmosis.

Imagine two tanks that are separated by a membrane that's permeable to water, but not to the dissolved minerals present in the water. Tank A contains tap water and Tank B contains the purified water. Under normal conditions, the purified water would cross the membrane to dilute the more concentrated tap water solution. In the reverse osmosis process, pressure is applied to the tap water tank to force the water molecules across the membrane into the pure water tank.

4) After the reverse osmosis system has been operating for 30 minutes, the solution in Tank A would
A) be hypotonic to Tank B.
B) be isotonic to Tank B.
C) be hypertonic to Tank B.
D) move by passive transport to Tank B.
Answer: C
Topic: 5.5
Skill: Application/Analysis

5) If you shut the system off and pressure was no longer applied to Tank A, you would expect
A) the water to flow from Tank A to Tank B.
B) the water to reverse flow from Tank B to Tank A.
C) the water to flow in equal amounts in both directions.
D) the water to flow against the concentration gradient.
Answer: B
Topic: 5.4
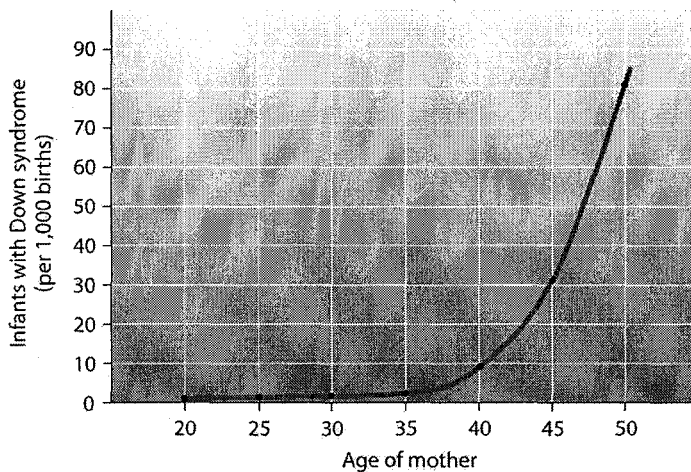Skill: Application/Analysis

This example bottled water, something all students will relate to, to illustrate the quantitative effect of the natural process of osmosis (simple diffusion of water) and the reversal of that process in the production of bottled water. The expectation is that the student determines to outcome of the nature versus unnatural process.

6) As a patch of scraped skin heals, the cells fill in the injured area but do not grow beyond that. This is an example of
A) density-independent inhibition.
B) density-dependent inhibition.
C) anchorage independence.
D) growth factor inhibition.

Answer: B
Topic: 8.7
Skill: Application/Analysis

Students must understand the difference in the quantitative principles of density-dependent activity and density-independent activity with respect to the outcome of cell replacement termination.

7) According to the graph, at what maternal age does the incidence of Down syndrome begin to increase substantially?

A) about 26 or 27
B) about 31 or 32
C) about 37 or 38
D) about 42 or 43
Answer: C
Topic: 8.19
Skill: Application/Analysis

Students must interpret graphically represented material.

8) If *A* is dominant to *a* and *B* is dominant to *b*, what is the expected phenotypic ratio of the cross: *AaBb* × *AaBb*?
A) 16:0:0:0
B) 8:4:2:2
C) 1:1:1:1
D) 9:3:3:1

Answer: D
Topic: 9.5
Skill: Application/Analysis

Student must understand the principles of inheritance, then use that information to calculate offspring genotypes which are used to determine phenotypic ratios.

9) You find the frozen remains of a woolly mammoth in an Alaskan glacier. You analyze a bit of the tusk and find that its $^{14}C{:}^{12}C$ ratio is about one-fourth (25%) of the baseline level typically found in living organisms. Given that the half-life of ^{14}C is 5,730 years, when did the mammoth die?
A) 5,730 years ago
B) almost 12,000 years ago
C) at least 25,000 years ago
D) approximately 75,000 years ago
Answer: B
Topic: 15.5
Skill: Application/Analysis

Students use radioactive decay principles to calculate the answer.

10) The recessive allele of a gene causes cystic fibrosis. For this gene among Caucasians, $p =$ 0.98. If a Caucasian population is in Hardy-Weinberg equilibrium with respect to this gene, what proportion of babies is born homozygous recessive, and therefore suffers cystic fibrosis?
A) $0.02^2 = 0.0004$
B) 0.02
C) $0.98^2 = 0.9604$
D) $2(0.02 \times 0.98) = 0.0392$
Answer: A
Topic: 13.10
Skill: Application/Analysis

Students use the Hardy-Weinberg equation from population genetics to calculate gene and phenotypic frequencies.

Teamwork:
CLASSROOM EXAMPLES (using clicker questions):

The following examples come from the Communication section, but here the emphasis is the fact that students work together to develop skills to convince their peers they are correct or to accept the logic of others. Regardless, the spirit of trust and reasoning is developed.

1. Students will answer clicker questions individually. The results of their answers will be recorded but students will not know whether they were correct. The same clicker question will be posed a second time and students will be permitted to discuss the question with a partner (think-pair-share) and answer a second time. Such communications permit students to analyze material and argue their viewpoint.
2. Students will work together at times to develop concept maps. Such diagrams permitted the logical development of subtopics in relation to a general theme. Such organized materials give a visual aspect to the organization of a topic. Again, students must argue and discuss the logic and development of the pattern of the map.

Social Responsibility and Personal Responsibility:

Although not required to this course does address these, too. Having the general knowledge of living things (in this course the concept of cells and their basic biochemistry) provides an understanding of life's nature, fragility, and wonder. The section on genetics gives understanding of heredity, genes, and very importantly, biotechnology. Finally, exposure (particularly for non-science majors) to evolutionary theory as the common thread throughout biology, the evidence supporting the theory, and the personal and societal consideration of evolution is crucial to the University-educated individual.

Will the syllabus vary across multiple section of the course?   ☐ Yes   X No
If yes, list the assignments that will be constant across sections:

Inclusion in the core is contingent upon the course being offered and taught at least once every other academic year. Courses will be reviewed for renewal every 5 years.

The department understands that instructors will be expected to provide student work and to participate in university-wide assessments of student work. This could include, but may not be limited to, designing instruments such as rubrics, and scoring work by students in this or other courses. In addition, instructors of core courses may be asked to include brief assessment activities in their course.

Dept. Signature: _____

The following courses have been reviewed and approved by the NSM Curriculum Committee to meet the new core requirements. Given the length of the individual submissions I have elected to submit these requests by electronic means only.

Natural Sciences: Core Courses

BIOL 1309 – Human Genetics and Society

BIOL 1310 – General Biology

BIOL 1320 – General Biology

BIOL 1361 - Introduction to Biological Science I

BIOL 1362 - Introduction to Biological Science II

CHEM 1301 – Foundations of Chemistry

CHEM 1331 – Fundamentals of Chemistry I

CHEM 1332 – Fundamentals of Chemistry II

GEOL 1302 - Introduction to Global Climate Change

GEOL 1330 - Physical Geology

GEOL 1340 - Introduction to Earth Systems

GEOL 1350 - Introduction to Meteorology

GEOL 1360 - Introduction to Oceanography

GEOL 1376 - Historical Geology

PHYS 1301 - Introductory General Physics I

PHYS 1302 - Introductory General Physics II

PHYS 1321 - University Physics I

PHYS 1322 - University Physics II

Mathematics: Core Courses

MATH 1310 – College Algebra

MATH 1311 – Elementary Mathematical Modeling

Math/Reasoning: Core Courses

COSC 1306 – Computer Science and Programming

MATH 1330 - Precalculus

MATH 1431 - Calculus I
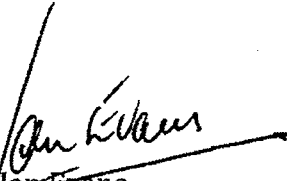
MATH 1432 – Calculus II

MATH 2311 – Introduction to Probability and Statistics

Writing in the Disciplines: Core Courses

BCHS Biochemistry Lab II

BIOL 3311 – Genetics Lab

PHYS 3313 – Advanced Lab I

Ian Evans

Associate Dean

4/4/13

BIOLOGY 1310, section 14380 COURSE OUTLINE: Fall 20XX

Dr. L. R. Williams,221F SR2: 743-2637, email: lrwilliams@uh.edu

OFFICE HOURS: TUESDAY, 10:30 TO 11:30 am, WEDNESDAY, 10:30 TO 11:30 am or
BY APPOINTMENT. Contact me by email for appointments.

WEEK:	TOPICS	CHAPTERS
28,30 Aug	Introduction; Life, Science, and Society	1
4,6 Sep	Chemistry of Life, Molecules	2,3
11,13 Sep	Structure, Energy, Cells; **EXAM ONE (Thursday)**	4, 5
18,20 Sep	Energy, Enzymes, and the Cell Membrane	5
25,27 Sep	Energy of Life; Cellular Respiration	6
2,4 Oct	Cellular Respiration; Photosynthesis	6,7
9,11 Oct	Cellular Reproduction; **EXAM TWO (Thursday)**	8
16,18, Oct	Introduction to Genetics Patterns of Inheritance	9
23,25 Oct	Molecular Genetics, Control of Gene Expression	10,11
30 oct,1nov	Control of Gene Expression; Biotechnology	11, 12
6,8 Nov	Biotechnology; **EXAM THREE (Thursday)**	12, 13
13,15 Nov	Intro to Evolution; Population Genetics and Evolution	13, 14
20,22 Nov	Evolution and Evolutionary History	15
27,29 Nov	Evolution of Life; **THANKSGIVING HOLIDAY is 22 Nov**	16, 17
4,6 Dec	Living Things Invades Land; Animal Diversity	18, 19

FINAL EXAM IS 8:00 AM THURSDAY, XX DEC 20XX

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THIS SCHEDULE IS SUBJECT TO CHANGE WITHOUT NOTICE.

ALL VIOLATIONS OF ACADEMIC HONESTY WILL BE HANDLED IN MOST SERIOUS MANNER.

HOW GRADES WILL BE EARNED:

Exams will be taken as scheduled on **Thursdays. Excused exams may be made up and I reserve the right to the format of those exams.** All exams will be 50 questions (points) each.

Additional points will be earned from in-class quizzes using your Turning Point (Technologies) response pad (clickers; more information about the pads is below). Additional use of the Clickers will include 1) survey questions to assess

opinions (done anonymously) and 2) questions imbedded in lectures to assess comprehension. Information for registering your clicker is posted on BlackBoard.

Homework will be assigned using Mastering Biology, the software purchased with your text (may have been purchased separately). Information for accessing and using Matering Biology is posted on BlackBoard. In addition, a representative from Pearson will come to class and demonstrate the use of Mastering Biology and options that assist you in learning the material.

Two (2) summaries, each two (2) pages long with citations on a topic of controversy related to lecture material. Each assignment will be graded on clarity of argument, grammar, use of citations, and citation clarity.

HOW YOUR GRADE WILL BE CALCULATED:

80%	EXAMS.
10%	HOMEWORK:
	Includes Mastering Biology, two required papers.
5%	In-class Clicker Quizzes.
5%	Two required short summaries

GRADE SCALE TO BE USED:

A	>92%
A-	90-92%
B+	88-89%
B	83-87%
B-	80-82%
C+	78-79%
C	73-77%
C-	70-72%
D+	68-69%
D	63-67%
D-	60-62%
F	<60

VERY IMPORTANT DATES YOU NEED TO KNOW:

XXday XX Sep 20XX: will not count toward your enrollment cap.

XXday XX Nov 20XX: last day to drop the course with a "W". My signature is NOT required. YOU DROP THROUGH PEOPLESOFT ON LINE.

Regardless, if you intend to drop the course, double check that you did so successfully.

WHAT YOU NEED TO PURCHASE FOR THIS COURSE:
PURCHASE THREE THINGS: TEXT, MASTERING BIOLOGY ACCESS, TURNING POINT TECHNOLOGIES "CLICKER"

TEXT: I have made arrangements with the publisher of the text for you to purchase a custom edition of the text with only the chapters we will cover and Mastering Biology for $49.50 directly from the publisher. Go to:

http://www.mypearsonstore.com/bookstore/product.asp?isbn=1256362174

This same customized text with Mastering Biology will be available in the UH Bookstore, but will cost more because of the Bookstore markup.

If you choose to purchase the text and Mastering Biology in another manner the text is:

Campbell Biology, 7th edition by Reece, Taylor, Simon, and Dickey.

 No other books are required.

CLICKER: Turning Point (Technologies) response card (also called a clicker or personal response pad), available in the UH University Center. This pad will be used for answering **in-class quiz** questions.

(Additional use of the Clickers will include 1) survey questions to assess opinions (done anonymously) and 2) questions imbedded in lectures to assess comprehension.)

ELECTRONIC DEVICES IN THE CLASSROOM.

YOUR CELL PHONES, PAGERS, OR OTHERS DEVICE SHOULD BE OFF OR MUTED. YOU SHOULD NOT BE TEXTING DURING CLASS OR ANSWERING TEXTS. IF YOU USE A LAPTOP, YOU SHOULD BE TYPING NOTES OR VIEWING THE PPT. ANY VIOLATORS WILL BE ASKED TO LEAVE THE CLASSROOM. THIS IS UNIVERSITY OF HOUSTON POLICY.

GOALS. Upon successful completion of this course you should:

1. Explain the methods of science and its application using experiments, data, reasoning, and logic as opposed to opinion.

2. Know the four basic organic molecule groups and their functions in cells.

3. Name the component structures of cells and their functions.

4. Explain the processes of cellular metabolism: photosynthesis and cellular respiration.

5. Comprehend simple inheritance patterns and demonstrate the ability to predict outcomes of matings.

6. Comprehend the structure and function of DNA and it's role in inheritance and the production of proteins.

7. List and explain main uses of biotechnology and formulate an opinion of the role of biotechnology in modern society.

8. Explain evolutionary theory expressing an understanding of its historical development, population genetics, species concept and modes of speciation, and the body of evidence supporting evolution.

9. Evaluate the strength of the evidence supporting evolutionary theory against weaknesses.

All the above should be applicable to your everyday life and well into the future.

SUGGESTIONS TO HELP YOU WITH THIS COURSE:

1. Come to class. You chose this class at this time and it is costing someone money for you to be here. Get your money's worth and learn something.

2. Take good notes. I will try to keep the material organized using topic headings and some form of outline.

3. Read your textbook. Minimally, read what is covered in lecture. Better yet, read each chapter completely while focusing on lecture topics. I may add supplemental material to read as appropriate current articles or information comes available. These will be posted on Blackboard.

4. Pay close attention to graphs, figures, and pictures that illustrate concepts and ideas. Develop the ability to use these devices as critical summaries of information.

5. Study. Keep up (or ahead). Use any study aids you have. If possible, **organize a study group** of classmates. I do not expect that you will always properly understand what is covered in a lecture at the end of that lecture. You will need to look your notes over, read the text, and think about things. It really helps to discuss the material with others in a study group. Most importantly, do not expect to "learn" everything the weekend (or night!) before the exam. Remember the general rule for college classes: Expect to spend 2 or 3 hours outside class studying and reading for each hour in class. That's a 9 to 12 hour/week commitment to a class.

6. If you need help, contact me. I have office hours set. I will return your emails and calls. If necessary, I will make an appointment with you to help. Do not wait until it is too late.

7. Do not consider what we cover as a series of facts to memorize, rather make everything a process that make sense. Remember, what we cover will be processes that living things do to maintain life. How can that not make sense or be logical?!