Honolulu Community College
General Education – DIVERSIFICATION DESIGNATION
Certification and Recertification
Application Form
Spring 2012

APPLICANT: John Shen

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COURSE ALPHA and NUMBER: BIO 100

COURSE TITLE: Human Biology

ESTIMATED NUMBER OF SECTIONS:
Fall: 3
Spring: 3

APPLICATION IS FOR:
☐ New Course  ☐ Modified Course  ☒ Existing Course  ☐ Re-designation
☐ Certification  ☐ Re-Certification. Date of last certification:

DIVERSIFICATION AREA DESIGNATION SOUGHT:
☐ DA (Arts)  ☐ DP (Physical Sciences)
☒ DB (Biological Sciences)  ☐ DS (Social Sciences)
☐ DH (Humanities)  ☐ DY (Laboratory)
☐ DL (Literature and Language)

What percentage of the CONTENT of this course focuses on this diversification area? 100%

What percentage of CLASS MEETINGS focuses on this diversification area? 100%
BIO 100 SYLLABUS
READING LIST FOR FIRST HALF OF THE COURSE AND INTRODUCTION

Introduction to the course & Organization of the Body

Chemical Terminology. Life is Chemistry
Basics and Macromolecules (4 classes)
Protein Synthesis (most important topic in the course)

Energy Utilization. High Energy Exchange
Molecules (ATP & NADH2). Aerobic Respiration of Glucose. What are enzymes & how do they work?

The Cell: Structure & Function. All the cells of the Human body share the same general structure & Function the same way

The 4 Classes of Tissues of the Body and the Integumentary System (skin & membranes)

M & M: Cell Division via MITOSIS OR MEIOSIS Patterns if Chromosomal Inheritance

The Male and Female Reproductive Systems

FIRST EXAM (Week of October 22 to 26)

Classical Genetics: Genotype and Phenotype And Mendelian Genetics
Human Genetics and Genetic Disorders (Dominant & Recessive).

The Digestive System & Nutrition
Structure and Function of the Digestive Organs and the Process of digesting Carbohydrates, Proteins and Lipids

The Cardiovascular System: Heart and Blood Vessels

The Cardiovascular System: Blood Serum and Formed Elements

The Respiratory System: READ
SECOND EXAM

The Skeletal System: READ Chapter 11

The Muscular System: READ Chapter 12

The Urinary System
Structure and Function of the Kidneys and of a Single Nephron Chapter 10

The Nervous System: The Central & Peripheral NS, The Somatic & Autonomic NS Chapter 12

The Nervous System: The Brain

The Endocrine System: Glands & Multifunctional Organs Chapter 13

THIRD MIDTERM

INSTRUCTOR: JOHN SHEN, 5-102, email: johnshen@hawaii.edu

Textbook: Human Biology 12th Ed. (11th or 10th is OK) Mader & Windelspecht

MIDTERM EXAMS: 3 Multiple Choice & Matching Exams. 100 pts each.
Handwritten crib sheet, standard paper, both sides, Permitted for each midterm exam

GRADE: Class curve based on 300 points total. A minimum of 150 points will be required for a passing grade

This course meets the Diversification Hallmarks for Biological Sciences (DB)
Course Descriptions
BIOL 100 - Human Biology

An introduction to the structure and function of cells, tissues, organs, and organ systems of the body. In addition, there will be selected topics on nutrition, infectious diseases and immunity, the nature of cancer, reproductive biology, and human genetic disorders.

3 hrs. lect. per week

STUDENT LEARNING OUTCOMES

Upon successful completion of BIOL 100, the student will be able to:

1. Define the following terms: atoms, ions, covalent bonds, hydrogen bonds, chemical formulas v. structural formulas, chemical names v. common names.

2. Demonstrate the polymeric nature of macromolecules and identify the basic subunits of those polymers.

3. Identify examples of representative carbohydrates, lipids, proteins, and nucleic acids. Also, define the three major differences between DNA and RNA and explain their involvement in protein synthesis.

4. Define the functions of ATP and reduced NAD as sources of cellular energy.

5. Demonstrate the function of enzymes within the cell.

6. Illustrate the process of the aerobic respiration of glucose to demonstrate how one molecule of glucose can yield 38 ATPs worth of energy.

7. Discuss the structure and functions of the cytoplasmic membrane of the the cell: phospholipid bilayer, selective permeability, passive diffusion, facilitated diffusion, osmosis, and active transport.

8. Describe the structure and function of the nucleus, cytoskeletal network, mitochondria, Golgi apparatus, lysosomes, different vacuoles, flagella, cilia, basal bodies, and centrioles.

9. Differentiate between the 4 classes of tissues that make up the human body and describe the characteristics and properties of each class.

10. Demonstrate the end results of Mitosis and Meiosis and discuss the importance of each process relative to the human body.
11. Describe the various components of the male and female reproductive systems and how they function.

12. Discuss the roles of hormones in the male and female reproductive systems and understand the female menstrual cycle in the context of 5 different hormones.

13. Answer the following questions about the female reproductive system: What is the function of the female orgasm? Why does it take more time for a woman to reach orgasm (compared to a man)? Why does the human female lack an estrus cycle (unlike all other female mammals)?

14. Differentiate between the various forms of STDs that afflict the human reproductive system.

15. Describe the basic elements of Mendelian and post-Mendelian genetics and how they apply to human genetics, and apply the terms: homozygous dominant, homozygous recessive, heterozygous, Punnett Square, genotypic ratio, phenotypic ratio, monohybrid cross, and dihybrid cross.

16. Describe human sex-linked disorders and explain why they are sex-linked.

17. Identify human dominant and recessive genetic disorders.

18. Discuss some recent aspects of Genetic Engineering including the cloning of genes and the potential cloning of humans.

19. Identify the components of human skin and the various mucous and serous membranes of the body.

20. Describe the generalized structure of bone and discuss the functions of the human skeletal system.

21. Describe the generalized structure of a muscle and discuss how muscles contract.

22. Compare and contrast the 3 different types of muscle and know where they are found.

23. Become familiar with the structure and function of the organs of the digestive system.

24. Compare the similarities and differences between arteries and veins.

25. Describe the flow of blood through the four chambers of the heart, and the lungs and the rest of the body.
26. Organize the 5 classes of leukocytes (wbcs) found in human blood and discuss the functions of each class. Also, define the lymphatic system of the body and discuss its importance in terms of function.

27. Designate the functions of the First, Second and Third Lines of defense of the human body. List five examples of mechanical external barriers and five examples of chemical external barriers.

28. Discuss the mechanism of the inflammatory response and compare the functions.

29. Describe the B-system of immunity (humoral) of the body in terms of the definition of an antibody (Ab) and how the Abs are classified according their structural differences and their functional differences. Detail how Abs are produced by the body.

30. Describe the T-system of Immunity (CMI) of the body. Detail how effector T-lymphocites are produced by the body. Explain some of the major CMI activities of the body and how they protect you from different pathogens and cancers.

31. Define the nature of allergic responses of the body and compare the Type I hypersensitivities with Type IV hypersensitivities. Also compare the differences between cutaneous localized anaphylaxis as opposed to generalized systemic anaphylaxis.

32. Describe some examples of Type IV hypersensitivity responses.

33. Compare the 4 different types of transplants or grafts into the human body and discuss the nature of ejection of transplanted tissues or organs. Discuss the graft v. host response.

34. Describe the structure and functions of the organs of the respiratory system. Become familiar with some diseases of the respiratory system.

35. Describe the structure and functions of the organs of the urinary system and detail the function of the individual nephron within a kidney.

36. Compare the central nervous system to the peripheral nervous system. Compare the somatic nervous system to the autonomic nervous system. Compare the Sympathetic to the Parasympathetic nervous system.

37. Discuss the structure and function of a neuron and a nerve. Describe the major components of the brain and what their functions are.

38. Describe the control of the endocrine system of the body by the hypothalamus of the brain.
Discuss the target tissues of various endocrine hormones and the responses of the target tissues. List some of the hormones produced by multifunctional organs of the body.
1. **Hallmarks and SLOs.** Please explain how course-specific SLOs align with the diversification area’s hallmarks.

**DB.1** Uses the Terminology of the Biological Sciences

I am attaching both the SLOs and the Syllabus for the course since enumerating the SLOs would be redundant. The first quarter of the course is spent on nothing but chemical terminology and cell biology so that the student can understand the rest of the textbook readings and the lectures themselves. I am going to assume that the board members reading this will understand that in order to cover all of the ten organ systems of the body and to discuss the structure and function of each organ in each system, there is nothing but biological terminology and this is what the students are tested on. (SLO 1-5).

**DB.2** Involves knowledge and theories relating to processes in the Biological Sciences

In human Anatomy and Physiology, there is equal emphasis placed upon these two topics throughout the course, but in Human biology, there is a distinct emphasis on physiology, or how each organ functions, with just enough anatomy so that the student can understand the terms used in discussing physiology.

Unlike an A & P course, there is much more attention paid to genetics (Mendelian, post-Mendelian, and non-Mendelian) and an emphasis on Human Genetics in terms of genetic Disorders, both dominant and recessive as well as modern genetic technology such that fields like recombinant DNA technology in bacteria (used in the production of human proteins like insulin, HGH, and IF) and PCR technology used in gene amplification with a number of applied uses are discussed. (SLOs #15, 16, 17, 18). In addition, the topic of animal cloning is addressed and the reason why it has not been either attempted or been successful in terms of cloning humans (SLO #18).

Basic biological processes are covered early in the course and every student is expected to master protein synthesis beginning with the template strand of DNA (gene) and performing both transcription and translation to arrive at the correct polypeptide amino acid sequence when provided with a Table of Anti-Codons. (SLO #3). Another basic biological process is the aerobic respiration of glucose by every single cell of the body (SLO #6). This includes understanding the processes of glycolysis, the Krebs’ Cycle, and the Electron Transport System and how they function together in the integrated process of aerobic respiration. The student also understands better the true importance of the digestive, respiratory and circulatory systems in their role of delivering glucose and oxygen to every cell of the body and eliminating the primary waste product of the aerobic respiration of glucose, carbon dioxide.

In addition, when discussing cellular membrane functions (SLO #7), the students are taught the basic rules of passive and facilitated diffusion and osmosis and active transport. In discussing active transport, there is a strong emphasis on the sodium ion/potassium ion Pump which is so critical in nerve cell impulse transmission, muscular contraction and relaxation, and the absorption of nutrients across the cells of the small intestinal lining (SLO # 21, 23, and 37).

**DB.3** Demonstrates that inquiry is guided by observation/experiment and reasoning.
If there is one area in which this course is deficient, it is in discussing the nature of the experiments to determine all of the physiological phenomena associated with each organ of the body. One of the rare instances in which experimental protocol is discussed is in describing how nerve impulse transmission was ultimately understood (SLO #37) using the giant axons of squids. This entire area of experimental protocols is better covered in upper division and graduate level courses for biological sciences majors and really should not be (and cannot be, due to time constraints) covered in a survey level course on the entire human body.

2. **Assessment strategies.** Explain assessment strategies you have used (or plan to use) to measure the degree to which students exit the course with the course-specific SLOs. If there are multiple sections of the course taught by different instructors, please discuss how assessment is (or will be) carried out across instructors.

The students are provided with a Behavioral Objectives study guide which they are supposed to use in studying for the course. It is up to them to utilize the B.O.s as a study guide, or not. There are 3 midterm examinations of 60 to 70 questions (multiple choice and matching) and generally, all of the material in a given bloc of instruction is covered in the exam. Generally speaking, students who average 90% or above on all three midterms will receive an “A” grade. I created and introduced this course at HCC roughly 20 years ago and up until 2 years ago was the sole instructor to teach this course. In the past two years, I have not taken it upon myself to discuss the course contents with the lecturers who now teach this course as well because I assumed they were bound to the same guidelines as I am. I will be calling a meeting of those instructors who also teach this course to discuss their curricula for the course and ensure the comprehensiveness of what they cover. I am going to assume that there will have to be some flexibility in terms of how they cover each topic, in terms of breadth and depth, and that is the nature of a survey level course with multiple instructors.

3. **Assessment of assessment.** How have you used (or plan to use) the assessment findings to modify or improve this course? If there are multiple sections of the course taught by different instructors, please discuss how review of assessment results is (or will be) carried out across instructors.

To date, I have not used assessments and assessments their helpfulness in improving the course. All of the improvements have come semester by semester and year by year as I have tried to simplify how concepts are presented in a classroom situation and also introduced different illustrations and examples to get the concepts across. I warn my students at the beginning of the Course that they should treat this course as almost a foreign language course since most of the terminology (an estimated 90%) will be new to them unless they had taken other college level biological sciences courses (or AO Biology in high school). My exams are geared to test whether or not they have learned about the structure and function of each organ covered in each one of the different organ systems of the body. When I convene the other BIO 100 lecturers, I will discuss how they assess their assessments.
DIVERSIFICATION BOARD DECISION:

☑ Approved
   Re-Certification Due: Fall 2017

☐ Not approved
   If not approved, reasons for disapproval:

Diversification Board Chair Signature: [Signature]
Date: 10/02/12