Course Outcomes Guide

Course/Program Title: **Date: January 16, 2015**
Bio 103/Bio 104

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Expected Learning Outcomes

1. Exhibit the ability to use core content in the Anatomy and Physiology curriculum (as evidence by a passing score on the comprehensive final exam common for all sections).
2. Apply physiological and anatomical principles of homeostasis to the disease state.
3. Demonstrate transfer of information from diagrams, models and non-human models to the human organisms.
4. General Education: Demonstrate the ability to access, process, analyze and synthesize scientific information.
    a. Relate a basic core of scientific principles to an open-ended framework
    b. Demonstrate observational and analytic skills in a structured situation.
    c. Formulate conclusions based on observations and information.

Assessment

Bio 103: HCC Cumulative Exam
Bio 104: HAPS Cumulative Exam (both semesters)

Validation

Compare student results for the HAPS cumulative exam to students that have taken exam at other colleges, and correlate student results for the HCC cumulative exam with student results for the HAPS cumulative exam.

Results/Follow-up Each instructor has reviewed class results for the cumulative exam to determine the concepts that their students scored below 50%. The areas of weakness are listed for each instructor followed by their intended follow-up.

Bio 103

Instructor 1 Results: Four areas of weakness include terminology for protein channels involved in secondary active transport, structure and function of glial cells, comparison of muscle tissue types, and energy molecules within skeletal muscle tissue.

Instructor 1 Follow-up: The most important concept that needs to be addressed is the structure and function of glial cells especially given the research that shows their increasing importance in both normal and abnormal function of the nervous system. Additional time, both during and outside of class, will be devoted to helping students master this material.

Instructor 2 – results and follow-up:

Question #	Content Area	Plan for Improvement
15	Secondary Active Transport	Concept is currently included on electronic homework assignments and addressed in lecture. Plan: Make sure that quizzes reflect questions that address this concept in order to identify student misconceptions. Clarify identified student misconceptions through the use of probing questions in lecture and lab.
19, 20	Proteins and Enzymes: Specifically protein synthesis and function of enzymes	Concept is currently included on electronic homework assignments and addressed in lecture. Plan: Make sure that quizzes reflect questions that address this concept in order to identify student misconceptions. Clarify identified student misconceptions through the use of probing questions in lecture and lab.
23	Features of connective tissue	Concept is currently included on electronic homework assignments, lab activities and addressed in lecture. Plan: Make sure that quizzes reflect questions that address this concept in order to identify student misconceptions. Clarify identified student misconceptions through the use of probing questions in lecture and lab.
29	Cell Signaling	Concept is currently included on electronic homework assignments, lab activities and addressed in lecture. Plan: Make sure that quizzes reflect questions that address this concept in order to identify student misconceptions. Clarify identified student misconceptions through the use of probing questions in lecture and lab.
35, 37	Nervous System: Anatomy of the spinal column Somatic Reflexes	Concept is currently included on electronic homework assignments, lab activities and addressed in lecture. Plan: Make sure that quizzes reflect questions that address this concept in order to identify student misconceptions. Clarify identified student misconceptions through the use of probing questions in lecture and lab.
48, 49	Special Senses: Anatomy of Ear Pathway of Light	Concept is currently included on electronic homework assignments, lab activities and addressed in lecture. Plan: Make sure that quizzes reflect questions that address this concept in order to identify student misconceptions. Clarify identified student misconceptions through the use of probing questions in lecture and lab.

58	Endocrine System: Parathyroid Hormone and Calcium	Concept is currently included on electronic homework assignments, lab activities and addressed in lecture. Plan: Make sure that quizzes reflect questions that address this concept in order to identify student misconceptions. Clarify identified student misconceptions through the use of probing questions in lecture and lab.
61	Function of Skeletal System	Realign lecture and content of lab to reflect current knowledge. Plan: Make sure that quizzes reflect questions that address this concept in order to identify student misconceptions. Clarify identified student misconceptions through the use of probing questions in lecture and lab.
70.	Muscles and energy	This question was identified as one that was ambiguous and has since been changed to reduce ambiguity.

Instructor 3 - results: Primary areas of weakness include membrane transport including osmosis, hormone function on a cellular level, and ion channels in muscle physiology and neuron physiology.

Instructor 3 – follow-up: Have students write neuron essay and muscle physiology essay. Develop various group activities that help students to master these areas.

Instructor 4 - results:

Q#	Su 2014 (%)	Fa 2014 (%)	Reference chapter
14	42	67	4
15	17	36	4
16	67	45	4
19	33	36	4
20	21	36	3
23	54	36	5
24	29	45	5
29	42	9	17

38	46	55	15
46	38	27	12
48	29	27	16
51	58	27	16
54	42	36	16
55	79	45	7
61	25	27	7
64	38	36	10 & 5
70	25	70	10

Instructor 4 – follow-up:

Areas of weaknesses identified:	Course of Action:
1. Chapter 4 Biology of the Cell ▪ Describing the relationship of osmosis and tonicity ▪ Comparing primary and secondary active transport ▪ Understanding the significance of DNA replication ▪ Understanding the sequences involved in protein synthesis	Incorporating cell transport concepts in cell building lab. Revised cell lab quiz to include cell transport questions targeting osmosis and tonicity. Review and update questions in Connect quizzes. Require all students do the Chapter 4 LearnSmart module. Review materials including links to websites explaining DNA replication, protein synthesis are made available on Moodle for returning non-traditional students.
2. Chapter 3 Energy, Enzymes, Cell Respiration ▪ Explaining how environmental factors can affect enzyme activity and the consequence of denaturation	The concept of denaturation is reinforced in Chemistry lab using the Chemistry of Life software program. A short essay question will be included on the chemistry lab quiz asking students to explain how environmental factors affect enzymes.
3. Chapter 5 Tissue/Histology ▪ Identifying the common features of connective tissue ▪ Explaining the relationship between each epithelial tissue type and its function	There are two lab sessions devoted to Histology. Students are also required to complete all the questions on the Tissue lab report and must be submitted to the instructor. The tissue lab quiz will be updated to include and target weaknesses identified in the cumulative exam. Review Chapter 5 Connect quiz questions already in place

	and chapter 5 LearnSmart tutorial will be part of course grading system.
4. Chapter 17 Endocrine • Describing the consequences of lipid-soluble hormones interaction with target cell receptors	Insert this concept in one of the Endocrine labs, most likely the Endocrine Activity lab and include a related question on the lab quiz. Check to see if there is an animated tutorial in Interactive Physiology related to this area in Endocrine System.
5. Chapter 15 Autonomic Nervous System • Comparing the effects of parasympathetic and sympathetic division	Spend extra time with students (outside of class) explaining autonomic nervous system via e-mail for hybrid students. A 20-question quiz related to this chapter is required on Connect and is also one of the LearnSmart modules assigned to students.
6. Chapter 12 Neurophysiology • Describing the structure and function neuroglial cells and compare these cells with neurons	The concept of neuroglial cells and neurons is included in Histology lab and reviewed in great detail in chapter 12. Review Chapter 12 quiz on Connect to include this topic. Chapter 12 LearnSmart module was made mandatory for A& P 103 in Fall 2014.
7. Chapter 16 General senses • Knowing the anatomic regions of the ear and explain their function • Explaining the steps for pathway of sound including the structures involved • Classifying the different types of sensory receptors and what they detect	There is a lab devoted to this chapter. Update lab quiz to include all the anatomic regions of the ear including function plus pathway of sound. Review questions on Connect quiz to include all areas of weaknesses in this chapter. LearnSmart module for Chapter 16 is part of the course grading system.
8. Chapter 7 Bone Structure & Function • Describing the formation and resorption of bone matrix • Explaining the general functions of the skeletal system	Incorporate these concepts when doing the skeletal system lab and in the lab quiz.
9. Chapter 10 Muscle Physiology • Differentiating the 3 types of muscle tissue • Explain the means of energy supply for muscle tissue	The 3 types of muscle tissue is discussed in great detail in Histology lab and again reviewed in Chapter 10 lecture. Check questions on Connect to make sure these areas are covered. Chapter 10 LearnSmart module must be completed and submitted by students. LearnSmart modules were initiated in Fall of 2014 and appeared to be helping the students (from 25% to 70%).

Instructor 1 - results: Primary areas of weakness include the endocrine system (digestive hormones, parathyroid hormone, reproductive hormones, and the general concepts related to steroid hormones). There were other isolated questions that students scored poorly on that were covered throughout both semesters.

Instructor 1 – follow-up: The endocrine system is a very challenging topic for students. Currently, three lectures and two labs are devoted to this topic. Additional attention will be given to verify that students are learning this material. In addition, following each lecture students are now (starting in Spring 2015) required to complete *one* of the following: (1) "learnsmart" assignment on Connect, or (2) quiz on Connect, or (3) Learning objectives in specific sections in the textbook.

Instructor 2 - results: Most of the questions missed were from the first exam on the cardiovascular system where I was using almost complete power point slides. After the first exam, I changed my teaching style to provide students with incomplete outlines that they would complete during lecture. I will admit that I didn't have as much time to cover the endocrine/reproductive hormones in detail, so I understand why those questions were missed.

Instructor 2 – follow-up: To increase information for cardiovascular topics, I will adapt the new teaching style. I will also make sure to provide better detail on the endocrine hormone pathway in female and male reproduction. Although I provided the class with a cumulative review study guide, I think it might help with information recall if I conduct a formal class review as well.

Instructor 3 - results: Major areas of weakness include blood (composition, erythropoietin regulation and coagulation), as well as the urinary system-more specifically the structure and function of the various parts of the nephron, including the hormonal regulation of electrolytes and water reabsorption/secretion.

Instructor 3 – follow-up:
Follow-up: Currently, almost two complete lectures and one lab are devoted to blood, and almost three complete lectures and one lab are devoted to the urinary system. In order to improve student's understanding and comprehension of key concepts, worksheets will be made available that address learning objectives. Additional time will be spent on both blood and the urinary system, both during and outside of class, to ensure understanding of these areas. Alternatively, or in addition to, the students will be required to answer relevant questions at the end of the Chapter texts.

Budget Justification
There will be a charge for the HAPS cumulative exam in the future. The charge will be $9.25 per exam.