Florida Agricultural and Mechanical University
Professional Education Unit
Tallahassee, Florida 32307

COURSE SYLLABUS

<table>
<thead>
<tr>
<th>COURSE NUMBER</th>
<th>Course Title</th>
<th>Credits</th>
<th>Clock Hours Per Week: 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCB-3723</td>
<td>Vertebrate Physiology</td>
<td>4.0</td>
<td>Lecture 3.0</td>
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<td></td>
<td></td>
<td></td>
<td>Laboratory 1.0</td>
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<td></td>
<td></td>
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<td>Demonstration (Yes) N/A</td>
</tr>
</tbody>
</table>

Department: Biology  Prerequisites: BSC 1010, BSC1011, CHM1045

College: Arts and Sciences

Required Textbook(s): Principles of Human Physiology by William J. German and Cindy L. Stanfield (2005), Publ: Benjamin Cummings

Faculty Name: Barack Otieno Abonyo  Term and Year: Fall 2010

Office Location 307 C Jones Hall  Campus Telephone: 561-2553

Office Hours (Others by Appointment)  Monday  Tuesday  Wednesday  Thursday  Friday  Saturday
10:30-12:15; 2:00-3:30  1:00-3:30  10:30-12:15

Course Description:

This course is an introductory study of the functional aspects of cells, organs and tissues of vertebrates. It is designed for upper division Biology, Biology Education, Pre-Medicine, Pre-Dentistry, Pre-Veterinary Medicine, and Nursing Students.

Overall Goals of the Course

Vertebrate Physiology is a one semester course offered by the Department of Biological Sciences. The goal of this course is to introduce the student to the physiology of vertebrates with emphasis on human Physiology so that they may understand the importance of the components of the tissues and organs on the overall function of the organism as it relates to human health, agriculture, and the environment. The laboratory is designed to instruct students in the use of laboratory instrumentation and experimental physiological techniques.

F=Florida Educator Accomplished Practices Standards (FEAPS)
I=Interstate New Teacher Assessment and Support Consortium Standards (INTASC)
(K)=Knowledge  (S)=Skill  (D)=Disposition

Approved/Revised 10/30/07
The Conceptual Framework in the Professional Education Unit (PEU) at Florida A&M University is an integrated approach to providing educational experiences that result in exemplary professional educators. The Framework is comprised of six themes with the mission of developing high quality classroom teachers, administrators and support personnel. The term “exemplary” refers to the kind of graduates the PEU strives to produce. The figure below provides a diagram of the Exemplary Professional Conceptual Framework:

### TECHNOLOGY

- **CF 2**

  **Through this focal area, the FAMU professional education candidate will:**

| CF: 2.1 (S) | Use of available technology and software to support student learning. | F: 4,12 | I: 6 |
| CF: 2.3 (K) | Know fundamental concepts in technology. | F: 12 | I: 1,6 |
| CF: 2.4 (K) | Understand fundamental concepts in technology. | F: 2,12 | I: 6 |
| CF: 2.5 (S) | Use fundamental concepts in technology. | F: 12 | I: 6 |
| CF: 2.6 (S,D) | Facilitate access to technology for students. | F: 12 | I: 6 |
| CF: 2.7 (S) | Facilitate the use of technology by students. | F: 4,12 | I: 6 |

### CRITICAL THINKING

- **CF4**

  **Through this focal area, the FAMU professional education candidate will:**

| CF: 4.1 (K) | Understand a variety of instructional/professional strategies to encourage student development of critical thinking and performance. | F:4,7 | I: 4 |
| CF: 4.2 (S) | Use a variety of instructional/professional strategies to encourage students’ development of critical thinking and performance. | F:2,7 | I: 4 |
| CF: 4.3 (D) | Value critical thinking and self-directed learning as habits of mind. | F: 4 | I: 1,4 |
| CF: 4.4 (K) | Acquire performance assessment techniques and strategies that measure higher order thinking skills of student. | F:1,4 | I: 1,8 |
| CF: 4.5 (S) | Demonstrate the use of higher order thinking skills. | F: 8 | I: 4 |

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Specific Behavioral Objectives

A student who successfully completes this course will be able to:

- Understand of the major physiological principles and terminology.
  - This outcome will be assessed by examinations in lecture and laboratory.
- Demonstrate oral and written communication skills.
  - This outcome will be assessed by examinations in laboratory, the scientific paper, and one oral presentation.
- Be able to analyze and interpret data, and critically interpret scientific information.
  - This outcome will be assessed by examinations in lecture and laboratory, especially the identification of microbial unknown. Also case studies, epidemiological analysis, and data interpretation will be included on worksheets and lab exercises.
- Demonstrate familiarity with basic scientific methodology and experimental procedures used in microbiology.
  - This outcome will be assessed by performance in the laboratory.

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Behavioral objectives</th>
<th>INTASC Standards</th>
<th>FEAPs</th>
<th>FTCE SAE</th>
<th>PEU Conceptual Framework</th>
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</thead>
<tbody>
<tr>
<td>Laboratory Project/Assignment 1</td>
<td>Demonstrate familiarity with basic scientific methodology and experimental procedures used in microbiology. This outcome will be assessed by performance in the laboratory (LAB PROJECT 1)</td>
<td>I: 1, 4, 6, 8</td>
<td>FEAPs: 4.1:4b, 4c, 4g, 4j, 8.1:8b, 8c, 8f, 12.1:12b, 12c, 12i, 12j, 12k, 12l</td>
<td>FTCE: 1.9 – 1.15, 2.4, 3.3, 3.4, 3.5, 3.8, 3.12, 3.14, 3.16, 4.6, 8.1 – 8.12</td>
<td>CF: 2.1, 2.3, 2.4, 2.5, 2.6, 2.7, 4.1, 4.2, 4.3, 4.4, 4.5</td>
</tr>
<tr>
<td>Laboratory Project/Assignment 2</td>
<td>Demonstrate familiarity with basic scientific methodology and experimental procedures used in microbiology. This outcome will be assessed by performance in the laboratory (LAB PROJECT 2)</td>
<td>I: 1, 4, 6, 8</td>
<td>FEAPs: 4.1:4b, 4c, 4g, 4j, 8.1:8b, 8c, 8f, 12.1:12b, 12c, 12i, 12j, 12k, 12l</td>
<td>FTCE: 1.9 – 1.15, 2.4, 3.3, 3.4, 3.5, 3.8, 3.12, 3.14, 3.16, 4.6, 8.1 – 8.12</td>
<td>CF: 2.1, 2.3, 2.4, 2.5, 2.6, 2.7, 4.1, 4.2, 4.3, 4.4, 4.5</td>
</tr>
<tr>
<td>Final Scientific Paper</td>
<td>Each student group turns in a written report on their topic that they will as presented to the class.</td>
<td>I: 1, 4, 6, 8</td>
<td>FEAPs: 4.1:4b, 4c, 4g, 4j, 8.1:8b, 8c, 8f, 12.1:12b, 12c, 12i, 12j, 12k, 12l</td>
<td>FTCE: 1.9 – 1.15, 2.4, 3.3, 3.4, 3.5, 3.8, 3.12, 3.14, 3.16, 4.6, 8.1 – 8.12</td>
<td>CF: 2.1, 2.3, 2.4, 2.5, 2.6, 2.7, 4.1, 4.2, 4.3, 4.4, 4.5</td>
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National and State Standards Addressed in the Course

Interstate New Teacher Assessment and Support Consortium (INTASC) Standards

**Standard 1: Subject Matter**
The teacher understands the central concepts, tools of inquiry, and structures of the discipline(s) he or she teaches and can create learning experiences that make these aspects of subject matter meaningful for students.

**Standard 4: Instructional Strategies**
The teacher understands and uses a variety of instructional strategies to encourage students’ development of critical thinking, problem solving, and performance skills.

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Standard 6: Communication
The teacher uses knowledge of effective verbal, nonverbal, and media communication techniques to foster active inquiry, collaboration, and supportive interaction in the classroom. Standard .

Standard 8: Assessment
The teacher understands and uses formal and informal assessment strategies to evaluate and ensure the continuous intellectual, social and physical development of the learner.

Florida Educator Accomplished Practices (FEAPs)

1. CRITICAL THINKING
4.1 The preprofessional teacher is acquiring performance assessment techniques and strategies that measure higher order thinking skills in students and is building a repertoire of realistic projects and problem-solving activities designed to assist all students in demonstrating their ability to think creatively.

4.PRE.b Identifies strategies, materials, and technologies that she/he will use to expand students' thinking abilities.
4.PRE.c Has strategies for utilizing discussions, group interactions, and writing to encourage student problem solving.
4.PRE.g Demonstrates and models the use of higher-order thinking abilities.
4.PRE.j Uses technology and other appropriate tools in the learning environment.

8. KNOWLEDGE OF SUBJECT MATTER
8.1 The preprofessional teacher has a basic understanding of the subject field and is beginning to understand that the subject is linked to other disciplines and can be applied to real-world integrated settings. The teacher’s repertoire of teaching skills includes a variety of means to assist student acquisition of new knowledge and skills using that knowledge.

8.PRE.b Increases subject matter knowledge in order to integrate the learning activities.
8.PRE.c Uses the materials and technologies of the subject field in developing learning activities for students.
8.PRE.f Develops short- and long-term personal and professional goals relating to knowledge of subject matter.

12. TECHNOLOGY
12.1 The preprofessional teacher uses technology as available at the school site and as appropriate to the learner. She/he provides students with opportunities to actively use technology and facilitates access to the use of electronic resources. The teacher also uses technology to manage, evaluate, and improve instruction.

12.PRE.b Uses technology tools on a personal basis.
12.PRE.c Demonstrates awareness of and models acceptable use policies and copyright issues.
12.PRE.i Selects and utilizes educational software tools for instructional purposes based upon reviews and recommendations of other professionals.
12.PRE.j Uses digital information obtained through intranets and/or the Internet (e.g., e-mail and research).
12.PRE.k Uses technology to collaborate with others.
12.PRE.l Develops professional goals relating to technology integration.

Florida Teacher Certification Examination (FTCE) Subject Area Examination (SAE) Competencies and Skills

1 Knowledge of the investigative processes of science
1.9 Differentiate the characteristics and methodologies of scientific and nonscientific knowledge.
1.10 Identify relationships between the variables and possible outcomes of a specific experiment.
1.11 Relate the validity and reliability of scientific knowledge to reproducibility, statistical significance, technological limitations, bias, and types of error.
1.12 Identify the development of biological theories and knowledge through important historical events, creative endeavors of diverse individuals, and experimental evidence.
1.13 Differentiate between qualitative and quantitative data in experimental, observational, and modeling methods of research.
1.14 Determine the elements of a well-designed and controlled experiment.

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1.15 Identify evidence of the dynamic nature of science in the face of new scientific information.

2 Knowledge of the interaction of science, technology, and society, including ethical, legal, and social issues
2.4 Identify pertinent legislation and national guidelines (e.g., National Association of Biology Teachers, International Society of Environmental Forensics, Occupational Safety and Health Administration chemical safety guidelines, material safety data sheets) regarding laboratory safety, hazardous materials, experimentation, and the use and handling of organisms in the classroom.

3 Knowledge of the chemical process of living things
3.3 Predict the effects of changes in pH, temperature, substrate concentration, and enzyme concentration on reaction rate.
3.4 Identify substrates, products, and relationships in aerobic respiration (e.g., glycolysis, the Krebs cycle, electron transport), including metabolism of carbohydrates, fats, and amino acids, and in anaerobic respiration (e.g., alcoholic fermentation, lactic acid fermentation).
3.5 Compare end products and energy yields of anaerobic and aerobic respiration.
3.8 Analyze the role of chemiosmosis in photosynthesis and respiration.
3.12 Evaluate the roles of cell recognition (e.g., cell-to-cell signaling, autoimmune diseases, tissue rejection, cancer, pollen or stigma-style interaction) in normal and abnormal cell activity.
3.14 Identify the roles of ATP and ADP in cellular processes.
3.16 Identify cell-to-cell communication (e.g., electrical, chemical) in living things.

4 Knowledge of the interaction of cell structure and function
4.4 Differentiate the events of each phase of the cell cycle (e.g., G1, S, G2, M) and the regulatory mechanisms of the cycle.
4.6 Compare characteristics of the major taxa (e.g., domains, kingdoms, phyla), including cellular characteristics.

8 Knowledge of the structural and functional diversity of animals
8.1 Relate the structures of animal tissue types (e.g., epithelial, connective, muscle, nervous) to their functions.
8.2 Characterize major animal body plans (e.g., symmetry, coelomic character, embryonic origin).
8.3 Identify the stages, sequence, and processes of differentiation in embryological development for representative animal phyla.
8.4 Relate the structures of circulatory and lymphatic systems to their functions.
8.5 Relate the structures of excretory and digestive systems to their functions.
8.6 Relate the structures of endocrine and nervous systems to their functions.
8.7 Relate the structures of integumentary and musculoskeletal systems to their functions.
8.8 Relate the structures of reproductive systems to their functions.
8.9 Relate the structures of respiratory systems to their functions.
8.10 Analyze how body systems contribute to the human immune response.
8.11 Analyze the interconnectedness of animal organ systems.
8.12 Analyze the effects of positive and negative feedback loops in human systems (e.g., vertebrate hormones, fight or flight).

National Science Teachers Association Standards

C.2.a. Core Competencies. All teachers of biology should be prepared to lead students to understand the unifying concepts required of all teachers of science, and should in addition be prepared to lead students to understand:
1. Life processes in living systems including organization of matter and energy.
2. Similarities and differences among animals, plants, fungi, microorganisms, and viruses.
8. Organization and functions of cells and multicellular systems.

C.2.b. Advanced Competencies. In addition to these core competencies, teachers of biology as a primary field should be prepared to effectively lead students to understand:
19. Historical development and perspectives in biology including contributions of significant figures and underrepresented groups, and the evolution of theories in biology.

C.2.c. Supporting Competencies. All teachers of biology should also be prepared to effectively apply concepts from other sciences and mathematics to the teaching of biology including basic concepts of:

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22. Chemistry, including general chemistry and biochemistry with basic laboratory techniques.

**Topical Outline and Tentative Course Calendar**

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic(s) for discussion and the corresponding chapter in the textbook</th>
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</thead>
<tbody>
<tr>
<td>8/29/09</td>
<td><strong>Introduction to Physiology - Chapter 1</strong></td>
</tr>
<tr>
<td></td>
<td>Organization of the body: Cells, tissues, organs and organ systems</td>
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<tr>
<td></td>
<td><strong>Homeostasis, negative feedback, thermoregulation - Chapter 1</strong></td>
</tr>
<tr>
<td>9/5/09</td>
<td><strong>Cell metabolism – Chapter 3</strong></td>
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<tr>
<td></td>
<td>Types of metabolic reactions and energy dispensation processes. Reaction rates, glucose oxidation and energy storage and use</td>
</tr>
<tr>
<td>9/12/09</td>
<td><strong>Cell membrane transport - Chapter 4</strong></td>
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<tr>
<td></td>
<td>Directionality of transport, rate of transport, passive and active transport. Osmosis and epithelial transport</td>
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<tr>
<td></td>
<td><strong>LECTURE EXAMINATION I</strong></td>
</tr>
<tr>
<td>9/19/09</td>
<td><strong>Chemical Messengers - Chapter 5</strong></td>
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<tr>
<td></td>
<td>Intracellular communications, classification of chemical messengers, signal transduction mechanisms, long distance communication</td>
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<tr>
<td></td>
<td><strong>Endocrine system - Chapter 6</strong></td>
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<tr>
<td></td>
<td>Primary and secondary endocrine organs. Hormone action at target cell. Abnormal hormone secretion and hormone interactions.</td>
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<tr>
<td>9/26/09</td>
<td><strong>Nerve Cell and electrical signaling - Chapter 8</strong></td>
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<td></td>
<td>The nervous system, Potassium and Sodium ions and membrane potential. Membrane potential and electrical signaling. Ligand and volatage gated channels. Neural stability</td>
</tr>
<tr>
<td>10/3/09</td>
<td><strong>LECTURE EXAMINATION II</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Synaptic transmission and neural integration- Chapter 9</strong></td>
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<tr>
<td></td>
<td>The nervous system. Potassium and Sodium channels involvement in membrane potential.</td>
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<tr>
<td>10/10/09</td>
<td><strong>Central nervous system-Chapter 10</strong></td>
</tr>
<tr>
<td></td>
<td>General anatomy of nervous system (CNS). CNS function, CNS motor control, CNS and language, CNS and sleep, CNS emotions, CNS and memory</td>
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<tr>
<td>10/17/09</td>
<td><strong>Sensory, autonomic and motor system -Chapter 12</strong></td>
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<td>Somatosensory, Vision, auditory, equilibrium, Autonomic versus somatic nervous system</td>
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<tr>
<td>10/24/09</td>
<td><strong>The muscle:- Chapter 13</strong></td>
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<tr>
<td></td>
<td>Skeletal muscle structure and function, Smooth muscle structure and function, Cardiac muscle structure and function</td>
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<tr>
<td>10/31/09</td>
<td><strong>Cardiovascular System - Chapter 14</strong></td>
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<tr>
<td></td>
<td>The heart structure and the blood vessels, Electrical activity of the heart</td>
</tr>
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<td></td>
<td>Cardiac cycle and cardiac output control and regulation, Blood flow and pressure</td>
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<td>Regulation, Lymphatic system</td>
</tr>
<tr>
<td>11/14/09</td>
<td><strong>Respiratory System - Chapter 17</strong></td>
</tr>
<tr>
<td></td>
<td>Understand mechanisms of lung function</td>
</tr>
<tr>
<td>11/21/09</td>
<td><strong>Renal function - Chapter 19</strong></td>
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</tbody>
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Understand mechanisms of kidney function

11/28/05  
**Gastrointestinal System - Chapter 21**
Understand reproductive structures and their function

12/5/05  
**Immune System - chapter 22**
Humoral Immunity, Cell mediated immunity, Diseases of the immune system

Finals week
**LECTURE EXAMINATION III**

**Teaching Methods**
Lectures, class discussions, brainstorming sessions, problem centered hands on investigations, research and technologies such as internet, CD-ROM, blackboard and computer animations

**Grading and Course Evaluation**
**Grades:**
Grades are calculated on a total points system:
3 lecture tests  x 70 points = 210
Assignments quizzes/worksheets (the number varies may vary) = 75
Microbe for the Day oral presentation - 15
To calculate your grade at any point during the semester, follow these steps-
First, divide the total points you have earned to date by the total possible points you have taken thus far, and then multiply this number by 100.

90-100% = A
80-89% = B
70-79% = C
60-69% = D
> 59% = F

**Course Policies**
**Policy Statement on Non-Discrimination** It is the policy of Florida Agricultural and Mechanical University to assure that each member of the University community be permitted to work or attend classes in an environment free from any form of discrimination including race, religion, color, age, disability, sex, marital status, national origin, veteran status and sexual harassment as prohibited by state and federal statutes. This shall include applicants for admission to the University and employment.

**Academic Honor Policy** The University's Academic Honor Policy is located in the FANG Student Handbook, under the Student Code of Conduct-Regulation 2.012 section, beginning on page 55-56.

**ADA Compliance** To comply with the provisions of the Americans with Disabilities Act (ADA), please advise instructor of accommodations required to insure participation in this course. Documentation of disability is required and should be submitted to the Learning Development and Evaluation Center (LDEC). For additional information please contact the LDEC at (850) 599-3180.

**References**
1. Vertebrates: Comparative Anatomy, Function, & Evolution by Kenneth V. Kardong
3. Multiple Vertebrate Anatomy Links (enjoy!): [http://science.kennesaw.edu/~rmatson/anatomylinks.html](http://science.kennesaw.edu/~rmatson/anatomylinks.html)

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