JEFFERSON COLLEGE

COURSE SYLLABUS

PTA 100

Anatomy and Physiology I for Physical Therapists
Assistants

5 Credit Hours

Prepared by:
Bridget B. Webb, PT, MPT, CEEAA Physical
Therapist Assistant Program Director

October 27, 2011

Elizabeth Check, Dean, Career and Technical Education
Dr. Mary Beth Ottinger, Division Chair
PTA100 Anatomy and Physiology I for Physical Therapist Assistants

I. CATALOGUE DESCRIPTION

A. Prerequisite: None
B. Credit hour award: 5
C. Description: This course begins with an introduction to basic concepts in biology and chemistry, including cellular components and division, genetics and inheritance, molecular transport, tissue types, atom structure, ions, pH, and use of the scientific method, before moving on to organ system level of organization of the human body. While each organ system will be presented, the skeletal, muscular, and nervous systems will be studied in greatest depth. Laboratory time is required. (F, S, Su)

II. EXPECTED LEARNING OUTCOMES AND ASSESSMENT MEASURES

(Numbers in parentheses refer to CAPTE performance expectations)

<table>
<thead>
<tr>
<th>Expected Learning Outcomes</th>
<th>Assessment Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Define the scientific method.</td>
<td>Summative Written Examinations</td>
</tr>
<tr>
<td></td>
<td>Quizzes</td>
</tr>
<tr>
<td></td>
<td>Written Assignments</td>
</tr>
<tr>
<td></td>
<td>Class Discussion/Activity</td>
</tr>
<tr>
<td>Apply the scientific method to a provided research article.</td>
<td>Written Assignments</td>
</tr>
<tr>
<td></td>
<td>Class Discussion/Activity</td>
</tr>
<tr>
<td>Differentiate between inductive and deductive reasoning.</td>
<td>Summative Written Examinations</td>
</tr>
<tr>
<td></td>
<td>Quizzes</td>
</tr>
<tr>
<td></td>
<td>Written Assignments</td>
</tr>
<tr>
<td></td>
<td>Class Discussion/Activity</td>
</tr>
<tr>
<td>Diagram the components of a cell.</td>
<td>Summative Written Examinations</td>
</tr>
<tr>
<td></td>
<td>Quizzes</td>
</tr>
<tr>
<td></td>
<td>Written Assignments</td>
</tr>
<tr>
<td></td>
<td>Class Discussion/Activity</td>
</tr>
<tr>
<td>Describe basic concepts of protein synthesis, genetics, and inheritance.</td>
<td>Summative Written Examinations</td>
</tr>
<tr>
<td></td>
<td>Quizzes</td>
</tr>
<tr>
<td></td>
<td>Written Assignments</td>
</tr>
<tr>
<td></td>
<td>Class Discussion/Activity</td>
</tr>
<tr>
<td>Compare and contrast various methods of molecular transport.</td>
<td>Summative Written Examinations</td>
</tr>
<tr>
<td></td>
<td>Quizzes</td>
</tr>
<tr>
<td></td>
<td>Written assignments</td>
</tr>
<tr>
<td></td>
<td>Classroom Discussion/Activity</td>
</tr>
<tr>
<td>Describe the differences among atoms, ions, and elements.</td>
<td>Summative Written Examinations</td>
</tr>
<tr>
<td></td>
<td>Written assignments</td>
</tr>
<tr>
<td></td>
<td>Classroom Discussion/Activity</td>
</tr>
<tr>
<td>Describe the differences among carbohydrates, lipids, and proteins.</td>
<td>Summative Written Examinations</td>
</tr>
<tr>
<td></td>
<td>Quizzes</td>
</tr>
<tr>
<td></td>
<td>Written assignments</td>
</tr>
<tr>
<td></td>
<td>Classroom Discussion/Activity</td>
</tr>
<tr>
<td>Describe the function of each organ system.</td>
<td>Classroom Discussion/Activity Quizzes Written assignments Summative Written Examinations</td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Contrast the composition of tissues of the organs that make up the skeletal, muscular, and nervous systems.</td>
<td>Summative Written Examinations Quizzes Classroom Discussion/Activity Written assignments</td>
</tr>
<tr>
<td>Demonstrate the ability to correlate gross anatomical skeletal and muscular structures with surface anatomy landmarks.</td>
<td>Classroom Discussion/Activity Laboratory Exercises</td>
</tr>
<tr>
<td>Demonstrate the ability to correlate gross central, peripheral, and autonomic nervous system structures with surface anatomy landmarks.</td>
<td>Classroom Discussion/Activity Laboratory Exercises</td>
</tr>
<tr>
<td>Describe the function of cells and cellular components of the skeletal, muscular, and nervous system structures.</td>
<td>Summative Written Examinations Quizzes Classroom Discussion/Activity Written assignments</td>
</tr>
<tr>
<td>Identify changes in the skeletal, muscular, and nervous systems across the lifespan.</td>
<td>Summative Written Examinations Quizzes Classroom Discussion/Activity Written assignments</td>
</tr>
<tr>
<td>Explain how the skeletal, muscular, and nervous systems function together.</td>
<td>Classroom Discussion/Activity Written assignments Summative Written Examinations</td>
</tr>
<tr>
<td>Describe muscle cell anatomy, physiology, and adaptations to resistance training.</td>
<td>Summative Written Examinations Quizzes Classroom Discussion/Activity Written assignments</td>
</tr>
<tr>
<td>Contrast the differences among skeletal, muscular, and nervous system function in a sedentary versus an active individual.</td>
<td>Summative Written Examinations Quizzes Classroom Discussion/Activity Written assignments</td>
</tr>
<tr>
<td>Identify principles of specificity of aerobic and resistance training in relation to muscle fiber size, type, and training effects.</td>
<td>Summative Written Examinations Quizzes Classroom Discussion/Activity Written assignments</td>
</tr>
</tbody>
</table>

### III. OUTLINE OF TOPICS

#### A. Scientific Method
1. Inductive Reasoning
2. Deductive Reasoning
B. Basic Chemistry
1. Atomic Structure
2. Chemical Bonds
3. Chemical Reactions
4. Properties of Water
5. Physiologic Role of pH
   a. Acids
   b. Bases
   c. Salts
6. Carbohydrates
7. Lipids
8. Proteins
9. Nucleic Acids
10. ATP
C. Cellular Level
1. Plasma Membrane
2. Organelles
3. Citric Acid Cycle
4. Nucleus
5. Protein Synthesis
6. Transport Mechanisms
   a. Diffusion
   b. Osmosis
7. Stages of Cell’s Life Cycle
8. Mitosis and Meiosis
   a. Spermatogenesis
   b. Oogenesis
9. Genes, Chromosomes, and Inheritance
   a. Patterns of Inheritance
   b. Variations, Mutations
   c. Sex Linked Inheritance
D. Tissue Level of Organization
1. Epithelial Tissue
2. Connective Tissue
   a. Cartilage
   b. Bone
3. Tissue Membranes
   a. Mucous Membranes
   b. Serous Membranes
   c. The Cutaneous Membrane
   d. Synovial Membranes
4. Muscle Tissue
   a. Skeletal Muscle Tissue
   b. Cardiac Muscle Tissue
   c. Smooth Muscle Tissue
5. Glands
a. Sebaceous Glands  
b. Sweat Glands  

E. Introduction to Anatomy and Physiology
1. Levels of Organization  
2. Homeostasis  
3. Anatomical Terms  
4. Body Cavities

F. Skeletal System
1. Bones  
a. Bone Matrix  
b. Bone Cells  
c. Compact Bone Structure  
d. Spongy Bone Structure  
e. Ossification  
2. Bone Development  
a. Effects of Exercise  
b. Hormonal and Nutritional Effects  
c. Calcium  
3. Bone Pathology  
a. Fracture  
b. Osteopenia  
c. Osteoporosis

G. Axial Skeleton
1. The Skull  
2. The Vertebral Column  
3. The Thoracic Cage

H. Appendicular
1. The Pectoral Girdle  
2. The Upper Extremities  
3. The Pelvic Girdle  
4. The Lower Extremities

I. Joints
1. Synovial Joints  
2. Intervertebral Discs and Ligaments  
3. Ball-and-Socket Joint  
4. Hinge Joint  
5. Arthritis and Other Degenerative Changes

J. Muscle Tissue
1. Skeletal Muscle  
a. Neuromuscular Junction  
b. Muscle Contraction  
c. Muscle Fiber Type and Physical Conditioning  
2. Cardiac Muscle  
3. Smooth Muscle

K. Muscular System
1. Fascicle Arrangement
2. Classes of Levers
3. Muscle Origins and Insertions
4. Axial Muscles
5. Appendicular Muscles
6. Effects of Age
7. Effects of Exercise

L. Neural Tissue
1. Anatomical Divisions
2. Functional Divisions
3. Neurons
4. Transmembrane Potential
5. Action Potential
6. Synaptic Activity
7. Neurotransmitters
8. Excitatory and Inhibitory Stimuli

M. Spinal Cord, Spinal Nerves, and Spinal Reflexes
1. Central Nervous System
2. Peripheral Nervous System
3. Spinal Cord
   a. Gray Matter
   b. White Matter
   c. Spinal Nerves
4. Reflexes

N. The Brain and Cranial Nerves
1. The Brain
2. Medulla Oblongata
3. The Pons
4. The Cerebellum
5. The Midbrain
6. The Diencephalon
7. The Limbic System
8. The Cerebrum
9. Cranial Reflexes

O. Sensory Pathways and the Somatic Nervous System

P. The Autonomic Nervous System and Higher-Order Functions

IV. METHOD(S) OF INSTRUCTION

A. Lecture
B. Textbook Readings
C. Supplemental Handouts
D. Active Learning in the classroom setting
E. Case Studies
F. Hands-on interaction during laboratory portion of course in which the students use microscopes, handle bones, etc.
V. REQUIRED TEXTBOOK(S)
   B. Interactive Physiology (IP-10) CD-ROM (included with textbook)
   C. Lab Manual: Integrate for Jefferson College

VI. REQUIRED MATERIALS
   A. A computer with internet access and basic software
   B. Course homepage available through Blackboard
   C. Binder, paper, pens, pencils with erasers

VII. SUPPLEMENTAL REFERENCES
   A. Class Handouts
   B. Library Resources
      1. Supplemental texts
      2. Databases
      3. Periodicals
      4. Videos
   C. Internet Resources
      1. On-line references
         a. anatomyarcade.com
         b. bbc.co.uk/science/humanbody/body

VIII. METHOD OF EVALUATION
   A. Summative Classroom Written Examinations: 30%
   B. Classroom Quizzes: 10%
   C. Lab Examinations: 20%
   D. Lab Quizzes: 10%
   E. Classroom Written Assignments: 20%
   F. Lab Written Assignments: 10%
   G. Grading Scale:
      A=90-100%
      B=80-89.9%
      C=70-79.9%
      D=60-69.9%
      F=under 60%
IX. ADA STATEMENT

Any student requiring special accommodations should inform the instructor and the Coordinator of Disability Support Services (Library: phone 636-797-3000, ext. 3169).

X. ACADEMIC HONESTY STATEMENT

All students are responsible for complying with campus policies as stated in the Student Handbook. Any student who cheats or plagiarizes will be subject to dismissal from their respective health occupations program and will be referred to the college for disciplinary action. (See College website, http://www.jeffco.edu/jeffco/index.php?option=com_weblinks&catid=26&Itemid=84 )