PTA 2

Kinesiology and Applied Anatomy

SYLLABUS AND COURSE INFORMATION PACKET

Spring 2017

4 credits
2 hour lecture/4 hours lab

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of the
City University of New York

Physical Therapist Assistant Program

Course Syllabus
PTA 2
Kinesiology and Applied Anatomy

Course Description: This course is designed to introduce the student to the anatomy of the musculo-skeletal system as well as basic kinesiology concepts. Joint goniometry is presented. The course emphasizes the role and nature of muscles, muscular origins; insertions; and innervations, as well as articular function and structure.


Pre-requisite Courses: BIO 11
Co-requisite Courses: PTA 1, PTA 10, PTA 20

Learning Objectives

As evidenced by successful performance and completion of written and practical examinations, assignments, laboratory activities, papers, oral reports, and role playing and analysis of clinical scenarios, the student will:

1.0 Apply knowledge of anatomy and kinesiology principles.
   1.1 Define kinesiology and the common terms associated with this study including kinematics, kinetics, torque, lever, etc..
   1.2 Identify the function and parts of the human skeleton.
   1.3 Define and recognize various types of joints, including synovial, cartilagenous, and fibrous.
   1.4 Define joint movement by referring to planes of movement and axes.
1.5 Identify and palpate bony prominences and common surface anatomy sites.
1.6 Discuss the concepts of mechanical advantage and leverage.
1.7 Identify origins, insertions, innervations, and actions for major muscles of the trunk, neck, shoulder girdle, shoulder joint, elbow, wrist, hand, hip, knee, ankle and foot.
1.8 Discuss the significance of muscular origins, insertions, innervations and actions as it relates to human movement and physical therapy practices.
1.9 Identify the structure and function of the neck, trunk, and extremities.
1.10 Identify joint play / accessory movement and their relationship to joint mobility techniques.
1.11 Given movement scenarios including common activities of daily living, identify joint position, agonists and antagonists, and synergistic relationships.

2.0 **Demonstrate understanding of anatomy and kinesiology principles and principles of muscle contraction.**
   2.1 State the contractile and mechanical properties of muscle tissue including length, elasticity and extensibility.
   2.2 Know types of muscle contractions including, isometric, isotonic, concentric and eccentric.
   2.3 Explain the practical implications related to the types of muscle contractions including: isometric, isotonic, and concentric.
   2.4 State the difference between vector and scalar quantities.
   2.5 Explain, demonstrate, and analyze motion in terms of force direction, torque production, and Newton’s Laws of motion.
   2.6 Analyze muscular torque production of several muscle groups using the Cybex HUMAC/NORM.
   2.7 Explain, demonstrate, and discuss the relationship between torque production and range of motion.

3.0 **Implement knowledge of anatomy and kinesiology principles with palpation of the upper and lower extremities, neck and trunk.**
   3.1 Palpate superficial bony prominences and soft tissue landmarks.
   3.2 Use the skills of soft tissue and bony prominence palpation to identify joint components.
   3.3 Report results of palpation and range of motion assessment to supervising physical therapist.

4.0 **Implement knowledge of anatomy and kinesiology principles with goniometry.**
   4.1 Define goniometry, its concepts and importance.
   4.2 Explain the importance of goniometry in the practice of physical therapy.
   4.3 Perform goniometry and functional assessment accurately and appropriately document range of motion, and recognize inappropriate documentation practices.
   4.4 Perform range of motion assessment using, digital, gravity, and water-based inclinometers.
4.5 Analyze the consistency of range of motion measurement methods.
4.6 Analyze and determine appropriate documentation of joint range of motion.

5.0 Compare alternative methods of assessing human movement
   5.1 Define terms such as electromyography and stroboscopic analysis.
   5.2 Demonstrate the ability to observe motion from goal orientation, anatomical, and segmental movement perspectives.

6.0 Given patient scenarios, implement physical therapy plan of care as directed by a physical therapist.
   6.1 Perform techniques demonstrating an understanding of the role of the physical therapist assistant in rehabilitation.
   6.2 Perform techniques appropriately employing universal precautions and sound body mechanics.
   6.3 Perform palpation and goniometry techniques considering influences of pathologies.
   6.4 Perform muscle length assessment such as Thomas and Ober test.
   6.5 Perform palpation and goniometry techniques considering influencing factors (psychosocial, cultural, economic, patient satisfaction, legal/ethical, etc.).
   6.6 Correlate palpation sites with potential pathologies and precautions (entrainment, pressure sensitivity, etc.).
   6.7 Identify response(s) that require the attention of the supervising physical therapist or immediate interventions such as basic first aid or cardiopulmonary resuscitation.
   6.8 Communicate patient response to supervising physical therapist.

7.0 Demonstrate appropriate professional behavior.
   7.1 Attend and be on time for class, lab, and scheduled appointments.
   7.2 Be prepared for lab activities; attend to tasks assigned.
   7.3 Accept constructive criticism and respond and/or follow through appropriately.
   7.4 Express self in a clear and easily understood manner.
   7.5 Maintain appropriate personal hygiene.
   7.6 Treat others with positive regard, dignity and respect.
   7.7 Analyze and examine professional literature considering: specific scientific methods, interpretation of results, and clinical significance in order to foster further personal investigation and clinical effectiveness.
   7.8 Explain the importance of lifelong learning.
   7.9 Describe how professional development can occur.

Student Assessment
As indicated in the student handbook, to receive a passing grade in this course the student must successfully complete all comprehensive examinations* (including practical examination) and assignments with a grade of “C” or better. Additionally, the instructor assesses student competencies in skills critical to this course using the standardized skills.
checklists, located in the laboratory, requiring a passing score of at least 90%. Critical skills in this course include:

1. Palpation of soft tissue and bony prominences of the shoulder, elbow, wrist/hand, hip, knee, and ankle.

**Grade Determination**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Mid-Term Examination</td>
<td>15%</td>
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<tr>
<td>Group Presentation</td>
<td>5%</td>
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<tr>
<td>Multiple-Choice Quizzes</td>
<td>15%</td>
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<tr>
<td>Participation</td>
<td>10%</td>
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<tr>
<td>Laboratory Activities</td>
<td>5%</td>
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<tr>
<td>Essay Quizzes</td>
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<td>*Practical Exam</td>
<td>15%</td>
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<tr>
<td>*Final Examination</td>
<td>20%</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
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**Mid-Term Examination**
Students take a cumulative examination covering the first six weeks of the course. The examination includes mainly short essay questions.

**Group Presentation/Project**
Students are divided into groups of 4 or 5. Each group is assigned a project examining the relationships of agonist and antagonists, torque production, power, and other contractile concepts. Each group shall use the HUMAC/NORM to gather data. Groups present their data and conclusions in a 15-20 minute presentation. Detailed instructions are provided by the instructor. Each group submits a single 4–5 chapter document that supports the group presentation/project. Each group member should author at least one chapter. However, the document should reflect a continuous flow of information and data and not read as 4 or 5 separate papers.

**Laboratory Activities**
A variety of laboratory activities are performed throughout the course. Certain laboratory activities are completed and submitted to the instructor for grading.
Quizzes
Three to five written quizzes are given throughout the semester. The quizzes consist mainly of short essay questions. Students also complete 3 to 5 multiple-choice quizzes.

Practical Examination
Students complete a practical examination. This examination is designed to assess students’ abilities in performing randomly assigned techniques.

Final Examination
Students take a cumulative final examination. The examination includes mainly short essay questions.

Course Outline

Week #1—Introduction & Skeletal System Review

Lecture
Reading Assignment: Lippert, pp. 3 – 29
This initial week introduces students to the definition of kinesiology and the rationale for its study, general clinical kinesiological terms and concepts. Descriptive terminology and specific joint movements, as well as types of motion are reviewed and studied. Review of basic skeletal system anatomy and physiology is also undertaken.

Laboratory
Chapters 1-2
Laboratory activities include skeletal system exercises and introductory activities in mechanics. Students are introduced to basic principles of goniometry and types of goniometers and range of motion assessment devices.

Week #2—Articular and Muscular System

Reading Assignment: Text chapters 3 - 5
During this week the student is introduced to the definition, type and components of the human joint. Cardinal planes and axes of movement are reviewed. Study of the muscular system is begun including, purpose of muscles, nomenclature and physical characteristics as initially introduced in BIO 11.

Laboratory
Chapters 3 – 5
Students perform activities reinforcing kinesiological concepts. Students identify movements, axes and planes on each other. Students perform goniometric measurements on known angles. Students are introduced to the use of water-based and digital inclinometers as alternative means of measuring range of motion.
**Week #3—Muscular System**
Reading Assignment: Text chapters 3 – 5
*This week includes the continuation of the examination of the muscular system. Topics covered this week include: the functional characteristics of muscle tissue, and the definitions of stretching and tenodesis. The concepts of leverage and mechanical advantage are also presented. The roles of muscles and types of muscle contraction are reviewed. Newton’s Laws of motion and muscle torque production is introduced.*

**Laboratory**
Chapter 8
*Students continue to perform practical activities demonstrating and applying kinesiological principles of leverage and advantage. Students perform activities demonstrating isotonic and isometric muscle contractions. Students perform and compare open and closed chain activities. The HUMAC/NORM is introduced as a method of visualizing torque production and its relationship to range of motion.*

**Week #4—The Neck & Trunk**
Reading Assignment: Text chapter 15
*This week introduces the student to the neck and trunk. Emphasis is placed on the identification of bones, landmarks, joints and ligaments. Trunk movements are reviewed. Origins, insertions, innervation and actions of key muscles are presented.*

**Laboratory**
Chapter 15
*Students continue to perform practical activities demonstrating and applying kinesiological principles. Students review, analyze, and role play patient scenarios demonstrating practical application of principles and concepts presented thus far.*

**Week #5—The Shoulder Girdle**
Reading Assignment: Text chapter 9
*This week introduces the student to the shoulder girdle. Emphasis is placed on the identification of bones, landmarks, joints and ligaments. Shoulder girdle movements are reviewed. The mechanics of movement are presented including scapulo-humeral rhythm. Origins, insertions, innervation and actions of key muscles are presented.*

**Laboratory**
Chapter 9
*Students perform group and individual activities that facilitate a greater understanding of the anatomy and kinesiology of the shoulder girdle. Muscular origins and insertions are reviewed. Students palpate superficial landmarks of the shoulder girdle.*
**Week #6--The Shoulder Joint**

**Lecture**

Reading Assignment: Text chapter 10

This week introduces the student to the gleno-humeral joint. Emphasis is placed on the identification of joint motions, range of motion, bones and landmarks, and the joint capsule. Shoulder goniometry is introduced. Origins, insertions, innervations, and actions of key muscles are presented.

**Laboratory**

Chapter 10

Students perform group and individual activities that facilitate a greater understanding of the anatomy and kinesiology of the gleno-humeral joint. Muscular origins and insertions are reviewed. Students palpate superficial bony and muscular landmarks of the gleno-humeral joint. Assessment and measurement of flexibility and muscle length is discussed with emphasis on two joint muscles. Shoulder goniometry is presented, practiced and performed. Patient scenarios highlighting brachial plexus injury with emphasis on its impact on the shoulder joint are reviewed. The HUMAC/NORM is used to demonstrate differences in agonist and antagonists.

**Week #7--The Elbow Joint and Forearm**

**Midterm Examination**

**Lecture**

Reading Assignment Text chapter 11

This week introduces the student to the elbow joint and forearm. Emphasis is placed on the identification of joint motions, range of motion, mechanics, bones, landmarks and ligaments. Origins, insertions, innervations and actions of key muscles are presented.

**Laboratory**

Chapter 11

Students perform group and individual activities that facilitate a greater understanding of the anatomy and kinesiology of the elbow and forearm. Muscular origins and insertions are reviewed. Students palpate superficial bony and muscular landmarks of the elbow joint. Assessment and measurement of flexibility and muscle length is discussed with emphasis on two joint muscles. Elbow goniometry is presented, practiced and performed.

**Week #8--The Wrist & Hand**

**Lecture**

Reading Assignment: Text chapter 12 – 13

This week examines the wrist. Emphasis is placed on the identification of joint motions, mechanics, bony landmarks and ligaments. Origins, insertions, innervations and actions of key muscles are presented.
**Laboratory**  
Chapter 12 – 13  
*Students perform group and individual activities that facilitate a greater understanding of the anatomy and kinesiology of the wrist and hand. Muscular origins and insertions are reviewed. Students palpate superficial bony and muscular landmarks. Assessment and measurement of flexibility and muscle length is discussed with emphasis on two joint muscles. Wrist and hand goniometry is presented, practiced and performed. HUMAC/NORM learning activities performed.*

**Week #9--The Hip Joint**  
*Lecture*  
Reading Assignment: Text chapter 18  
*The structure, motions and mechanics of the hip joint are presented. Bony landmarks of the pelvis and proximal femur are reviewed. The functional anatomy of the joint capsule is presented. Angle of declination and femoral torsion are discussed and related to function. Origins, insertions, innervations and actions of key muscles are reviewed.*

**Laboratory**  
Chapter 18  
*Students perform group and individual activities that facilitate a greater understanding of the anatomy and kinesiology of the hip joint. Students palpate superficial bony and muscular landmarks of the hip. Assessment and measurement of flexibility and muscle length is discussed with emphasis on two joint muscles. Hip goniometry is presented, practiced and performed. HUMAC/NORM learning activities performed.*

**Week #10—The Hip con’t**  
*Lecture*  
*The discussion of the hip continues with an examination of the muscular origins, insertions, innervations and actions of key muscles. The synergistic nature of hip muscle actions are presented.*

**Laboratory**  
*Muscular origins and insertions are reviewed. Patient scenarios highlighting hip pathologies including coxa valgus/varus, ante/retroversion, avascular necrosis and osteoarthritis are analyzed. Their impact on hip movement is explored.*

**Week #11--The Knee Joint**  
*Lecture*  
Reading Assignment: Text chapter 19  
*The structure and motions of the knee joint are presented. Emphasis is placed on the bony landmarks, ligaments, cartilage, and mechanics of the knee joint. Origins, insertions, innervations and actions of key muscles are reviewed.*

**Laboratory**  
Chapter 19  
*Students perform group and individual activities that facilitate a greater understanding
of the anatomy and kinesiology of the knee. The functional implications of genu recurvatum, valgus, and varus are explored. Muscular origins and insertions are reviewed. Students palpate superficial bony and muscular landmarks of the knee. Assessment and measurement of flexibility and muscle length is discussed with emphasis on two joint muscles. Knee goniometry is presented, practiced and performed. HUMAC/NORM learning activities performed.

**Week #12--The Ankle and Foot**

**Lecture**

Chapter 20

The structure, motions, and mechanics of the foot and ankle are presented. Emphasis is placed on bony landmarks, and key ligaments. Origins, insertion, innervations and actions of major muscles are reviewed.

**Laboratory**

Chapter 20

Students perform group and individual activities that facilitate a greater understanding of the anatomy and kinesiology of the ankle and foot. Muscular origins and insertions are reviewed. Students palpate superficial bony and muscular landmarks. Assessment and measurement of flexibility and muscle length is discussed with emphasis on two joint muscles. Ankle goniometry is presented, practiced and performed. HUMAC/NORM learning activities performed.

*Access-Ability Services (AAS) serves as a liaison and resource to the KCC community regarding disability issues, promotes equal access to all KCC programs and activities, and makes every reasonable effort to provide appropriate accommodations and assistance to students with disabilities. Please contact this office if you require such accommodations and assistance. Your instructor will be glad to make the accommodations you need, but you must have documentation from the Access-Ability office for any accommodations.*

**Academic dishonesty is prohibited in The City University of New York and is punishable by penalties, including failing grades, suspension, and expulsion. Additional information can be found in the College catalog (http://www.kingsborough.edu/sub-registration/Pages/catalog.aspx). Plagiarism is a violation of academic integrity. Plagiarism is the intentional theft(s) of someone else’s intellectual property without attribution (proper credit). Determination and penalty – ranging from grade reduction to course failure – will be decided by the instructor.**

***Class attendance is a vital part of the learning experience. A student who has been absent 15% or more of the total instructional hours that a class meets may be considered excessively absent by the instructor. The instructor may consider excessive absences as a factor in the assignment of a student’s grade.***

****The course professor utilizes a variety of teaching methodologies to facilitate accomplishment of student learning objectives. These methodologies may include interactive lecturing, supervised group and simulation activities, web-based instruction, use of custom computer based study guides, and active learning strategies.***