



Course Number and Title: PTA 115 Kinesiology

Campus Location:

Georgetown, Wilmington

Effective Date:

2020-52

Prerequisite:

BIO 121, (PHY 110 or PHY 112 or PHY 171 or PHY 205),
PTA 100, BIO 123 or concurrent, SSC 100 or concurrent

Co-Requisites:

none

Course Credits and Hours:

3.00 credits

2.00 lecture hours/week

2.00 lab hours/week

Course Description:

This course examines the relationship between the muscular and skeletal systems that provide motion through the biomechanical leverage system.

Required Text(s):

Obtain current textbook information by viewing the [campus bookstore - https://www.dtcc.edu/bookstores](https://www.dtcc.edu/bookstores) online or visit a campus bookstore. Check your course schedule for the course number and section.

Additional Materials:

Provided by Instructor

Schedule Type:

Classroom Course

Disclaimer:

None

Core Course Performance Objectives (CCPOs):

1. Use professional behaviors in the classroom. (CCC 3, 4; PGC 6)
2. Illustrate how the general principles of biomechanics relate to physical therapy. (CCC 2, 6; PGC 3)
3. Examine the functional kinesiology of muscles and joints. (CCC 2, 6; PGC 3)
4. Illustrate how the force of gravity affects posture and joint motion. (CCC 2, 6; PGC3)
5. Demonstrate the functional kinesiology of the vertebral column. (CCC 2, 6; PGC 3)
6. Examine the functional kinesiology of the upper extremity. (CCC 2, 6; PGC 3)
7. Demonstrate the functional kinesiology of the lower extremity. (CCC 2, 6; PGC 3)
8. Examine the components of gait and how it is affected by biomechanical factors. (CCC 2, 6; PGC 3)

See Core Curriculum Competencies and Program Graduate Competencies at the end of the syllabus. CCPOs are linked to every competency they develop.

Measurable Performance Objectives (MPOs):

Upon completion of this course, the student will:

1. Use professional behaviors in the classroom.
 1. Demonstrate professional behavior patterns consistent with beginning-level generic abilities. These include but are not limited to adhering to designated times for each educational experience, being adequately prepared, participating in class discussions, and displaying appropriate interpersonal dynamics and communication skills.
2. Illustrate how the general principles of biomechanics relate to physical therapy.
 1. Define *kinematics* and *kinetics*.
 2. Describe and demonstrate the three lever systems.
 3. Define *static equilibrium*.
 4. Discuss Newton's laws.
 5. Define and identify line of gravity, center of gravity, lever arm, moment arm, and torque.
 6. Solve for unknown forces in simple equilibrium problems.
 7. Draw and label free body diagrams.
 8. Discuss the clinical relevance of changing the moment arm of the resistance.

9. Describe three types of motion, planes of motion, and directions of motion.
 10. Discuss general concepts of range of motion and muscle testing.
 11. Define internal and external forces.
 12. Name three characteristics of a force vector.
 13. Describe concurrent, parallel, and linear force systems.
 14. Define and demonstrate a force couple.
 15. Describe and solve problems for mechanical advantage, torque, and sum of forces.
 16. Discuss and demonstrate clinical relevance of biomechanical principles.
3. Examine the functional kinesiology of muscles and joints.
 1. Describe the different end feels in joints.
 2. Explain accessory motions of joints.
 3. Describe basic principles of joint mobilization.
 4. Distinguish the relationship between stability and mobility.
 5. Describe and apply the arthrokinematics and osteokinematics for each joint.
 6. Describe the various joint classifications and identify examples.
 7. Describe the joint capsule, and discover how it affects joint mobility and stability.
 8. Choose an open and closed kinematic chain, and demonstrate an exercise for each.
 9. Give examples of rolling, sliding, and spinning relating to arthrokinematic motion.
 10. Distinguish between loose pack and closed pack position and between hypomobility and hypermobility of joints.
 11. Describe basic effects of injury and disease on joints.
 12. Describe the convex-concave relationship and how it affects joint motion.
 13. Identify the elements of muscle structure.
 14. Give examples of and describe muscle fiber types and arrangement.
 15. Describe and demonstrate muscle tension and length/tension ratio.
 16. Illustrate the functions of a muscle.
 17. Describe and demonstrate the various types of muscle contractions.
 18. Explain speed and angular velocity.
 19. Describe the factors affecting muscle tension and function.
 20. List and give examples of the various classifications of muscles such as synergist, antagonist, agonist, tonic, and phasic.
 21. Discuss and demonstrate passive insufficiency and active insufficiency of two-joint muscles.
 22. Describe machines used in testing muscular strength power and endurance.
 23. Describe and demonstrate how to position the limb when goal of treatment is to increase muscle length versus to increase joint range of motion (ROM).
 4. Illustrate how the force of gravity affects posture and joint motion.
 1. Describe optimal resting posture in any position.
 2. Define and analyze posture in various positions with respect to different joints.
 3. Describe the effects of decreased muscular strength in the trunk and in other parts of the body and explain their relationship to posture.
 4. Discuss and demonstrate how the line of gravity affects joint motion.
 5. Demonstrate the functional kinesiology of the vertebral column.
 1. Review the different types of vertebra, and describe their characteristics.
 2. Review the various components of the vertebral column, such as vertebra, muscles, discs and ligaments, and explain their functions.
 3. Describe the general effects of aging and injury to the vertebral column.
 4. Explain the four main functions of the vertebral column.
 5. Apply the biomechanical responses to motion and the clinical application.
 6. Discover the unique regional differences of the vertebral column and how those differences affect motion.
 7. Prepare various levels of exercises for the vertebral column.
 6. Examine the functional kinesiology of the upper extremity.
 1. Discuss and identify the joints directly associated with the shoulder, their functions, and normal range of motion (ROM) at each joint.
 2. Describe and palpate the muscles of the shoulder and scapula.
 3. Describe the rotator cuff muscles and their role in the force couple of the glenohumeral joint.
 4. Distinguish between dynamic and passive stability of the shoulder.
 5. Predict the arthrokinematic motions of the shoulder joint during osteokinematic movement.
 6. Explain the effects of immobilization on normal motion of the shoulder.
 7. Recognize common structural dysfunctions of the shoulder joint.
 8. Describe the force couple for glenohumeral elevation.
 9. Indicate the role of the sternoclavicular and acromioclavicular joints in scapulo-humeral rhythm.
 10. Discuss the various joints of the elbow, wrist, and hand.
 11. Identify factors affecting mobility and stability of the elbow, wrist, and hand.
 12. Differentiate functional relationships of the elbow, wrist, and hand to each other.
 13. Describe the carrying angle.
 14. Recognize common structural dysfunctions of the elbow, wrist, and hand.
 15. Describe the functional position of the wrist and hand.
 16. Recognize prehension of the hand and/or thumb.
 17. Demonstrate various levels of exercises for the upper extremity.

7. Demonstrate the functional kinesiology of the lower extremity.
 1. Describe the arthrokinematics of hip and knee joint.
 2. Describe and demonstrate the Trendelenberg sign.
 3. Describe common structural dysfunctions of the hip and knee joints.
 4. Discuss how the patella increases moment arm of the quadriceps muscles.
 5. Describe and demonstrate coordinated movements of the femur, pelvis, and lumbar spine.
 6. Describe and measure the quadriceps angle (Q angle).
 7. Describe the arthrokinematics of the ankle and foot.
 8. Describe and palpate the various segments of the foot.
 9. Describe the normal weight distribution of the foot.
 10. Describe common structural dysfunctions of the foot and ankle.
 11. Describe and measure range of motion (ROM) required in the hip, knee, and ankle for functional activities.
 12. Demonstrate various levels of exercises for the lower extremity.
8. Examine the components of gait and how it is affected by biomechanical factors.
 1. Identify and differentiate the various components of the gait cycle in traditional terms and Rancho Los Amigos terms (RLA).
 2. Break down distance and time variables and general phases of the gait cycle.
 3. Identify and demonstrate internal and external forces that effect gait.
 4. Analyze how muscle weakness and limited joint movement of the lower extremities (LE) affect gait.
 5. Compare and contrast components of the gait cycle on various human subjects.
 6. Differentiate the role of the muscles of the LE during each phase of the gait cycle.

Evaluation Criteria/Policies:

Students must demonstrate proficiency on all CCPOs at a minimal 75 percent level to successfully complete the course. The grade will be determined using the Delaware Tech grading system:

92	-	100	=	A
83	-	91	=	B
75	-	82	=	C
0	-	74	=	F

Students should refer to the [Student Handbook - https://www.dtcc.edu/handbook](https://www.dtcc.edu/handbook) for information on the Academic Standing Policy, the Academic Integrity Policy, Student Rights and Responsibilities, and other policies relevant to their academic progress.

Final Course Grade:

Calculated using the following weighted average

Evaluation Measure	Percentage of final grade
Summative: Modular & Final Exams (3-4) (equally weighted)	55%
Summative: Graded Labs/Competencies/Final Practical (3-6)(equally weighted)	40%
Formative: Generic Abilities Tool for Professional Behaviors (equally weighted)	5%
TOTAL	100%

Core Curriculum Competencies (CCCs are the competencies every graduate will develop):

1. Apply clear and effective communication skills.
2. Use critical thinking to solve problems.
3. Collaborate to achieve a common goal.
4. Demonstrate professional and ethical conduct.
5. Use information literacy for effective vocational and/or academic research.
6. Apply quantitative reasoning and/or scientific inquiry to solve practical problems.

Program Graduate Competencies (PGCs are the competencies every graduate will develop specific to his or her major):

1. Work under the supervision of a physical therapist in an ethical, legal, safe and effective manner.
2. Implement PT interventions within the plan of care.
3. Perform specific data collection techniques related to the plan of care.
4. Demonstrate effective communication in the physical therapy environment.
5. Formulate appropriate judgments and modification to the program within the patient's plan of care.
6. Demonstrate effective interactions and professional behaviors.
7. Participate in career development activities.
8. Exhibit a commitment to the physical therapy profession, physical therapy patients, and the community.

Disabilities Support Statement:

The College is committed to providing reasonable accommodations for students with disabilities. Students are encouraged to schedule an appointment with the campus Disabilities Support Counselor to request an accommodation needed due to a disability. A listing of campus Disabilities Support Counselors and contact information can be found at the [disabilities services - https://www.dtcc.edu/disabilitysupport](https://www.dtcc.edu/disabilitysupport) web page or visit the campus Advising Center.