



BROWARD COMMUNITY COLLEGE COURSE OUTLINE

LAST REVIEW: 2006-2007
(i.e. 2003-2004)

NEXT REVIEW: 2011-2012
(i.e. 2008-2009)

STATUS: A
(A, I, D)

COURSE TITLE: Applied Kinesiology

COMMON COURSE NUMBER: PHT 2120

CREDIT HOURS: 1

CONTACT HOUR BREAKDOWN
(per 16 week term)

CLOCK HOURS:
(Voc. Course ONLY)

Lecture: Lab: 32

Clinic: Other:

PREREQUISITE(S): PHT 2224

COREQUISITE(S): PHT 2120L

PRE/COREQUISITE(S):

COURSE DESCRIPTION (750 characters, maximum):

This course is designed as part of a continuum in the application of anatomy to facilitate student analysis of functional movements with specific focus on the relationship between joint structure and function. Principles of biomechanics as it relates to human movement will be reviewed. Normal and pathological gait patterns are presented as well as normal and pathological movement patterns of the head, spine, pelvis, UE, and LE. Special tests which help identify specific deficits will be discussed. Case studies of various functional impairments with an emphasis on functional task analysis as well as therapeutic interventional approaches which help restore function are presented. Orthotic interventions for the spine and extremities are discussed with an emphasis on correcting pathological biomechanics.

UNIT TITLES

- 1.0 *Biomechanics*
- 2.0 *Kinesiology of the Pelvis*
- 3.0 *Kinesiology of the Hip*
- 4.0 *Kinesiology of the Knee, Ankle and Foot*
- 5.0 *Characteristics of Normal Gait*
- 6.0 *LE Orthotics*
- 7.0 *Kinesiology of the Shoulder Unit*
- 8.0 *Kinesiology of the Elbow, Wrist and Hand*
- 9.0 *Kinesiology of the Head and TMJ*
- 10.0 *Kinesiology of the Spine*



BROWARD COMMUNITY COLLEGE COURSE OUTLINE

ASSESSMENT:

Please provide a brief description (250 characters maximum) that details how students will be assessed on the course outcomes.

1. Announced and unannounced quizzes and Unit examinations;
 2. Mid term and/or Final Exam (cumulative/comprehensive);
 3. Assessment of reading and online assignments via submission of homework projects;
 4. Participation in Discussion Forums on the WebCT site
- *** Complete the following only if course is seeking general education status ****

GENERAL EDUCATION Competencies and Skills*:

Please highlight in green font all Competencies/Skills from the list below that apply to this course. In the box to the right of the Competency/Skill, enter all specific learning outcome numbers (i.e. 1.1, 2.7, 5.12) that apply.

1. Read with critical comprehension	
2. Speak and listen effectively	
3. Speak and listen effectively	
4. Think creatively, logically, critically, and reflectively (analyze, synthesize, apply, and evaluate)	
5. Demonstrate and apply literacy in its various forms: <i>(highlight in green ALL that apply)</i> (1. technological, 2. informational, 3. mathematical, 4. scientific, 5. cultural, 6. historical, 7. aesthetic and/or 8. environmental)	
6. Apply problem solving techniques to real-world experiences	
7. Apply methods of scientific inquiry	
8. Demonstrate an understanding of the physical and biological environment and how it is impacted by human beings	
9. Demonstrate an understanding of and appreciation for human diversities and commonalities	
10. Collaborate with others to achieve common goals.	
11. Research, synthesize and produce original work	
12. Practice ethical behavior	
13. Demonstrate self-direction and self motivation	
14. Assume responsibility for and understand the impact of personal behaviors on self and society	
15. Contribute to the welfare of the community	

** General Education Competencies and Skills endorsed by '05-'06 General Education Task Force*



BROWARD COMMUNITY COLLEGE

COURSE OUTLINE

Common Course Number: PHT 2120

UNITS

Unit 1 Biomechanics

General Outcome:

- 1.0 The student will be able to define/describe concepts that relate to the biomechanics of human movement

Specific Instructional Objectives:

Upon successful completion of this unit, the student will be able to:

- 1.1 Review some of the basic mathematical principles used in biomechanics.
- 1.2 Describe forces that affect human movement.
- 1.3 Present the basic concepts in kinematics and kinetics.
- 1.4 Describe some of the most useful and general properties of materials.
- 1.5 Correlate the clinical relevance of mechanical properties of biological tissues to human movement.
- 1.6 Briefly review basic bone biology and terminology.
- 1.7 Describe mechanical properties of human bone.
- 1.8 Discuss the clinical relevance of understanding bone properties.
- 1.9 Review briefly the structure of muscle and the mechanism of skeletal muscle contraction.
- 1.10 Examine the factors that influence a muscle's ability to produce a motion.
- 1.11 Examine the factors that influence a muscle's ability to produce force.
- 1.12 Consider how muscle architecture is specialized to optimize a muscle's ability to produce force or joint motion.
- 1.13 Demonstrate how an understanding of these factors can be used clinically to optimize a patient's performance.
- 1.14 Discuss the adaptations that muscle undergoes with prolonged changes in length and activity.
- 1.15 Describe the structure and composition of cartilage in relation to its mechanical behavior.
- 1.16 Describe the current state of understanding of joint lubrication.
- 1.17 Describe the etiology of osteoarthritis in terms of mechanical factors.
- 1.18 Describe the components and organization of dense regular connective tissues, particularly tendons and ligaments.
- 1.19 Discuss the mechanical behavior of tendons and ligaments in response to tensile loads.
- 1.20 Describe physical factors affecting the mechanical properties of tendons and ligaments.
- 1.21 Describe biological factors affecting the mechanical properties of tendons and ligaments.
- 1.22 Discuss the response of tendons and ligaments to immobilization and remobilization.
- 1.23 Describe the mechanical properties of tendons and ligaments during healing.
- 1.24 Describe the effects of stress enhancement on the mechanical properties of tendons and ligaments.
- 1.25 Describe the design and general structure of human joints.
- 1.26 Discuss the factors that influence the stability and mobility of a joint.
- 1.27 Classify joints anatomically and biomechanically.
- 1.28 Define the terminology used to describe joint motion biomechanically.
- 1.29 Discuss the production and control of joint motion.



Common Course Number: PHT 2120

Unit 2 Kinesiology of the Pelvis

General Outcome:

- 2.0 The student will be able to understand the basic kinesiology and biomechanics of the pelvis as it relates to the practice of physical therapy.

Specific Instructional Objectives:

Upon successful completion of this unit, the student will be able to:

- 2.1 Discuss the structure and ligamentous support of the lumbosacral articulation to understand its contribution to the transfer of weight to the sacrum and how pathology contributes to its dysfunction.
- 2.2 Discuss the structure, ligaments, and function of each of the articulations between the sacrum and innominate bones and between the two innominate bones and to identify how each ensures stability while permitting movement between specific skeletal elements.
- 2.3 Describe structural alterations in pelvic articulations over time and in subpopulations and the effects these changes impose on pelvic somatic function.
- 2.4 Identify the amount of motion available between the axial and appendicular elements of the bony pelvis as well as between the hemipelvis and to discuss the sequelae of alterations in available motion.
- 2.5 Understand how alterations in the normal alignment can result in impaired function and the imposition of potentially harmful loads on adjacent structures.
- 2.6 Compare the bony pelvis of the male and female.
- 2.7 Discuss the role of the bony pelvis in visceral function of the pelvis region.
- 2.8 Discuss clinically relevant aspects of the development and anatomy of the pelvic floor.
- 2.9 Describe details of the structure, innervation, and function of the muscles of the pelvic diaphragm.
- 2.10 Discuss the various dysfunctions of the muscles of the pelvis and perineum relative to aging, gender, nervous degeneration, muscle atrophy, and vaginal delivery
- 2.11 Examine the forces sustained by the lumbosacral junction.
- 2.12 Analyze the forces across the sacroiliac joints.
- 2.13 Investigate the mechanics of pelvic fractures.



Common Course Number: PHT 2120

Unit 3 Kinesiology of the Hip

General Outcome:

- 3.0 The student will be able to understand the basic kinesiology and biomechanics of the pelvis as it relates to the practice of physical therapy.

Specific Instructional Objectives:

Upon successful completion of this unit, the student will be able to:

- 3.1 Investigate details of the hip's bony structure to understand how specific characteristics contribute to the stability and mobility of the hip joint.
- 3.2 Study the noncontractile supporting structures of the hip to understand their effects on its stability and mobility.
- 3.3 Examine the normal ranges of motion (ROMs) available at the hip.
- 3.4 Examine the relative alignment of the pelvis and femur and consider its contributions to normal and abnormal mechanics of the hip.
- 3.5 Compare the structure and function of the hip and the glenohumeral joint, its counterpart in the upper extremity.
- 3.6 Describe the actions produced by the one-joint hip muscles and how those actions are influenced by hip position.
- 3.7 Examine the impact of muscle impairments at the hip.
- 3.8 Begin to discuss the functional roles performed by the hip muscles during stance and gait.
- 3.9 Investigate the factors that influence the magnitude of the forces on the hip joint.
- 3.10 Examine the loads applied to the hip joint during dynamic activities.
- 3.11 Discuss the stress sustained by the femoral head during activity.
- 3.12 Consider the clinical relevance of force analysis at the hip joint.



Common Course Number: PHT 2120

Unit 4 Kinesiology of the Knee, Ankle, and Foot

General Outcome:

- 4.0 The student will be able to understand the basic kinesiology and biomechanics of the knee, ankle and foot as they relate to the practice of physical therapy.

Specific Instructional Objectives:

Upon successful completion of this unit, the student will be able to:

- 4.1 Describe the structure of the bones and articulations of the knee joint and their affects on the mobility and functional capacity of the knee.
- 4.2 Discuss the contribution of the muscles of the knee to the normal mechanics and pathomechanics of the knee.
- 4.3 Examine the forces sustained by the knee during normal function and consider the role of these forces in knee joint pathology.
- 4.4 Discuss the structure of the bones of the knee and how the structure affects the mobility and stability of the knee joint.
- 4.5 Examine the complex three-dimensional movement of the tibiofemoral and patellofemoral articulations.
- 4.6 Examine the normal alignment of the bones of the knee joint.
- 4.7 Consider the articular structures that contribute to the stability of the knee joint.
- 4.8 Consider the contributions made by muscles to the pathomechanics of the knee joint.
- 4.9 Present a two-dimensional analysis of the force required of the quadriceps during simple exercises.
- 4.10 Examine the forces and stresses that are applied to the tibiofemoral joint and their relationship to osteoarthritis of the knee.
- 4.11 Consider the loads in the cruciate ligaments as a result of quadriceps femoris and hamstring muscle contraction.
- 4.12 Analyze the forces at the patellofemoral joint under varying exercise strategies.
- 4.13 Discuss the structure of the bones and joints of the ankle and foot and how these features contribute to the role of weight bearing and propulsion.
- 4.14 Discuss the role of muscles in the mechanics and pathomechanics of the ankle and foot.
- 4.15 Analyze the forces to which the ankle and foot are subjected, particularly during weight bearing activities.
- 4.16 Discuss the functionally relevant structural features of the bones of the ankle and foot.
- 4.17 Describe the architecture and supporting structures of the joints of the ankle and foot.
- 4.18 Describe how the joints of the foot function together to produce total foot motion in the open and closed chain.
- 4.19 Describe the normal alignment of the foot and ankle.
- 4.20 Briefly discuss the roles the ankle and foot play during locomotor activities.
- 4.21 Examine the loads sustained by the muscles and joints of the ankle and foot during function.
- 4.22 Investigate the reported loads applied to the plantar surface of the foot during weight-bearing activities.



Common Course Number: PHT 2120

Unit 5 Characteristics of Normal Gait

General Outcome:

- 5.0 The student will be able to analyze normal and pathological gait patterns with an understanding of biomechanical functioning.

Specific Instructional Objectives:

Upon successful completion of this unit, the student will be able to:

- 5.1 Define commonly accepted terminology related to gait.
5.2 Outline the ranges of motion and muscular contraction that create motion during each of the subdivisions of stance and swing phases of gait.
5.3 Discuss the general characteristics of a normal gait pattern.
5.4 Describe the characteristics of common gait deviations.
5.5 Discuss interventions that might be implemented to correct specific gait deviations.
5.6 List the etiology and specific conditions that result in particular gait deviations.
5.7 Understand the value of educating the patient/client and/or care giver in proper fit of the orthotic device including information on how the device functions.
5.8 Determine appropriate means of addressing safety concerns regarding the proper use of the orthotic device.



Common Course Number: PHT 2120

Unit 6 LE Orthotics

General Outcome:

- 6.0 The student will be able to discuss the significance of the use of LE orthotics in the management of a patient's condition.

Specific Instructional Objectives:

Upon successful completion of this unit, the student will be able to:

- 6.1 Complete a DVD module on the topic of orthotics for the lower extremity.
- 6.2 List the functions of upper extremity orthosis/splints.
- 6.3 Distinguish between a splint and an orthosis.
- 6.4 Discuss the characteristics of splints.
- 6.5 Determine methods to identify patient/clients and/or care givers ability to care properly for a lower extremity orthotic device.
- 6.6 Discuss use and management of orthotics in: peripheral nerve injuries, sprains, flaccidity/spasticity, tendon repairs/transfers, fractures, and others as presented
- 6.7 Recognize methods to determine proper fit including skin inspection.
- 6.8 Understand the value of educating the patient/client and/or care giver in proper fit of the orthotic device including information on how the device functions.
- 6.9 Determine appropriate means of addressing safety concerns regarding the proper use of an orthotic.
- 6.10 List the functions of lower extremity orthotics.
- 6.11 Discuss the characteristics of orthotic devices including: foot orthosis, ankle-foot orthosis, knee ankle foot orthosis, hip orthosis, fracture braces, reciprocating gait orthosis and others as presented



Common Course Number: PHT 2120

Unit 7 Kinesiology of the Shoulder Unit

General Outcome:

- 7.0 The student will be able to understand the basic kinesiology and biomechanics of the shoulder as it relates to the practice of physical therapy..

Specific Instructional Objectives:

Upon successful completion of this unit, the student will be able to:

- 7.1 Understand the morphology of the individual components of the shoulder complex.
- 7.2 Identify the functional relationships among the individual components within the shoulder complex.
- 7.3 Discuss how the structures of the shoulder complex contribute to mobility and stability.
- 7.4 Provide insight into the stresses that the shoulder complex sustains during daily activity.
- 7.5 Describe the structures of the individual bones that constitute the shoulder complex.
- 7.6 Discuss the factors contributing to stability and instability at each joint within the shoulder complex.
- 7.7 Discuss the relative contributions of each articulation to the overall motion of the shoulder complex.
- 7.8 Discuss implications of abnormal motion at an individual joint to overall motion of the shoulder.
- 7.9 Examine the forces sustained by structures throughout the shoulder complex.
- 7.10 Consider the loads on the shoulder when the upper extremity is used for propulsive activities



Common Course Number: PHT 2120

Unit 8 Kinesiology of Elbow, Wrist and Hand

General Outcome:

- 8.0 The student will be able to understand the basic kinesiology and biomechanics of the elbow, wrist and hand as they relate to the practice of physical therapy.

Specific Instructional Objectives:

Upon successful completion of this unit, the student will be able to:

- 8.1 Discuss the structure of the bones that constitute the elbow and their effect on joint mobility and stability.
- 8.2 Present the functional units of the elbow and the noncontractile structures that support them.
- 8.3 Compare the structure and function of the elbow with those of the shoulder.
- 8.4 Review the loads the elbow sustains during a variety of activities.
- 8.5 Discuss the stresses (load/area) applied to the humeroulnar and humeroradial articulations.
- 8.6 Describe the structure of the bones of the wrist and hand to understand how they contribute to movements of the hand.
- 8.7 Discuss the ligaments and supporting structures of the joints of the wrist and hand and their contribution to the stability of the hand.
- 8.8 Demonstrate the clinical relevance of some of the specific anatomical details of the bones and ligaments of the region.
- 8.9 Examine the forces on the wrist joint and surrounding structures during activities.
- 8.10 Review the loading patterns and stresses on specific structures of the wrist complex.
- 8.11 Discuss common hand deformities that result from disruption of these connective tissue structures.
- 8.12 Discuss the classification schemes describing prehension.
- 8.13 Examine the positions of the joints of the wrist and hand during normal pinch and grasp.
- 8.14 Investigate the muscles needed for powerful pinch and grasp.
- 8.15 Explore the forces to which the digits are subjected during pinch and grasp.
- 8.16 Consider how the forces generated during pinch and grasp can contribute to deformities in the hand.



Common Course Number: PHT 2120

Unit 9 Kinesiology of the Head and TMJ

General Outcome:

- 9.0 The student will be able to understand the basic kinesiology and biomechanics of the head and the TMJ as they relate to the practice of physical therapy.

Specific Instructional Objectives:

Upon successful completion of this unit, the student will be able to:

- 9.1 Discuss the movement dysfunctions that result from weakness in these muscles.
9.2 Review the structure and function of the articular components of the TMJ
9.3 Describe how TMJ structures and dysfunction may contribute to patient complaints.
9.4 Briefly discuss the relationship between the TMJ and posture of the head and cervical spine.
9.5 Examine the loads on the structures of the TMJ
9.6 Consider the role that loading may have on the etiology of TMJ dysfunction.



Common Course Number: PHT 2120

Unit 10 Kinesiology of the Spine

General Outcome:

- 10.0 The student will be able to understand the basic kinesiology and biomechanics of the spine as it relates to the practice of physical therapy.

Specific Instructional Objectives:

Upon successful completion of this unit, the student will be able to:

- 10.1 Relate the structure of the bones and joints of each spinal region to the mobility and stability available in that region.
- 10.2 Discuss the role of the muscles of a spinal region in moving and supporting the region as well as their contributions to special functions.
- 10.3 Consider the effects of joint or muscle impairments on the function of each spinal region.
- 10.4 Examine the loads normally applied to the spinal region and discuss the mechanical factors that contribute to injuries in each of the spinal regions