

CARROLL UNIVERSITY
DOCTOR OF PHYSICAL THERAPY PROGRAM
Syllabus – Spring 2015
Dr. David Bazett-Jones

Course Number and Title: PTH 414: Advanced Kinesiology

Course Description:

This course applies biomechanical concepts to joint specific and whole-body kinesiology. Musculoskeletal structure and function as they relate to the production of normal human movement are explored using a variety of analysis techniques. Palpation clinical skills are introduced and practiced. The course integrates concepts of posture, balance, and human movement, including gait analysis.

Musculoskeletal Track Mission Statement:

The *patient-centered* aim of the Musculoskeletal Track within the Entry-Level Doctor of Physical Therapy Program in the Division of Natural and Health Sciences at Carroll University is to facilitate student growth and acquisition of the knowledge and attributes consistent with the American Physical Therapy Association and Carroll University to effectively serve others. We strive to produce a generalist clinician who is a compassionate professional, competent in the integration and clinical application of anatomy, biomechanics, kinesiology, pathology, and orthopedics for appropriate patient/client management. Each student will learn to function as an autonomous practitioner and apply principles of best practice in a holistic fashion to patients with musculoskeletal conditions.

Major theme: “Structure determines function and dysfunction may alter structure.”

Required Texts:

Neumann, Donald A. (2010). Kinesiology of the Musculoskeletal System: Foundations for Rehabilitation. (2nd Ed). Mosby Elsevier, St. Louis, MO.

Biel, Andrew (2010). Trail Guide to the Body. (4th edition). Books of Discovery, Boulder, CO.

Wittle’s Gait Analysis???

Additional Reading/Educational Supplements:

As appropriate, additional texts, article readings, and video/DVD viewing may be assigned via LMS.

Course Objectives:

Upon successful completion of the course, the student will:

1. Know, understand and apply fundamental biomechanical concepts to human function.
 - a. Explain kinematics and kinetics necessary for normal human posture and movement using accurate biomechanical terminology.
 - b. Describe normal kinematics and kinetics of fundamental human motions.
 - c. Explains biomechanical factors for posture and movement associated with activities of daily living including center of mass, center of pressure, base of support, ground reaction force, load, etc.
 - d. Describe the skeletal muscle, bone, tendon, and ligament tissue mechanics and apply them to joint kinesiology.
2. Know, understand, apply, and integrate fundamental kinesiological concepts.
 - a. Categorize skeletal muscle actions as isometric, eccentric, concentric.
 - b. Identify joint arthrokinematics.
 - c. Explain the convex/concave rule and determine appropriate clinical application for joint mobilization.
 - d. Summarize biomechanical muscle-joint interactions in single and multi-joint extremity and spine movements.
 - e. Perform joint play assessment to spine and extremities.

3. Be able to safely, effectively and efficiently apply the following analysis techniques and tools for the study of human movement.
 - a. Palpation.
 - b. Posture-posture chart/plumb line; visual assessment.
 - c. Gait and other movement analyses through visual and video assessment.

Course Requirements:

Each student is responsible for all materials assigned and presented in class or online whether the student is present or absent.

This course design is called a “flipped” classroom. You will “attend” lecture outside of class through recorded lectures and/or assigned readings. During class time, you will have opportunity to ask questions and complete your “homework”. The content and experience are the same; the order (lectures at home, homework in class) is just flipped! Our hope is that this allows you to better learn, understand, and apply the material in this course.

Lectures & Assigned Readings

Lectures should be viewed prior to attending class. Assigned readings (book chapters, articles, laboratory procedures, etc.) should also be reviewed prior to class and laboratory sessions. All materials are available for purchase through the bookstore or via LMS. **Each class and laboratory session will be conducted under the assumption that you are prepared. If you are not adequately prepared, you will not benefit from your attendance in class and lab.**

Exams

There will be 4 exams in this course. The first exam, the anatomy review exam, will take place the first day of class (see schedule below). The other 3 exam dates can be found in the course schedule. Exams will take place in the CGS computer labs. Exams are accessed via LMS and you will be allowed 2 hours for each exam. Exam question formats include, but are not limited to, multiple choice questions, matching, short answer, problem solving, calculation, and essay. Consider all exams to be cumulative. The information, theories, applications, etc., which were learned in a previous section of the course (and previous courses) are the building blocks for future sections. Example: Biomechanical information is applied to anatomy in the kinesiology course, which is part of the basis of studying musculoskeletal disorders. Everything leads into the next process or step!

IMPORTANT: If you leave the testing screen, you will not be allowed to return and finish your exam. You will receive the grade for what you have completed.

Students who would like to protest answers or scores for exams must do so within 2 weeks of the conclusion of the examination in question. This must be done during an individual appointment with the instructor.

Homework & Discussion

Homework assignments are developed which will help you to learn, review, and discuss specific, important concepts. Homework will be completed in groups while you are in class. You are expected to turn homework in, as a group, by 5pm the day of that class. Homework should be turned in via the LMS course site and should be typed whenever possible.

Interaction with the material, instructor, and peers is important so that the instructor can adapt the course to better serve you and your learning needs. One way to do this is through online discussions in LMS. You will be expected, for each unit of this course, to submit 2 questions. You are also expected to answer two questions that others have submitted. Your initial questions must be submitted 3 days prior to the exam for that unit. Answers can be submitted up to the exam time. This section counts for 5% of your total grade, with homework making up 70% of this grade and discussion 30% of this grade.

Kinesiology Kit

A Kinesiology Kit is an instructional guide into the construction and function of a specific joint. You can think of it as a “build your own human joint” kit. The goal of the Kinesiology Kit project is that you will be able to integrate fundamental concepts of anatomy and biomechanics in order to better understand the function of specific joints, especially in relation to other joints. A kinesiology Kit has the following items: list of parts, instruction manual on how things are put together (constructed), a description of how the joint works, and a digital story of the interaction between joints during movement.

This assignment will be performed with groups of 4 students who are assigned to your group. Each group will have a joint of the body that they will create the Kinesiology Kit for (foot, ankle, knee, hip, lumbar spine, cervical spine, GH, SC, elbow, wrist, or hand). This project will be 25% of your final grade and you will present your digital story during the final exam period. This grade will include peer assessment during the final presentation, peer-evaluation of group members, and evaluation of the project by the instructor.

Final projects will be placed on www.kinesiologykits.com for the world to see and evaluate by leaving comments.

Museum Vlog

During this course, we work to bring all of the joint kinesiology concepts together to integrate them into discussions of human posture and movement. However, a missing component of this discussion is how culture and environment influences human posture and movement. In the Carroll DPT Program, we attempt to integrate patient values into every classroom. One of the areas of patient values is thinking about and providing care in a culturally competent fashion. To investigate these missing components, we will be taking a field trip to the Milwaukee Public Museum. The museum’s exhibits provide many different contexts in which to discuss the influence of culture and environment on human posture and locomotion. By using the various exhibits, you will be given an opportunity to compare and contrast culture and environmental influences on movements to varying degrees. We hope that this assignment will help you to continue to think about providing physical therapy to a diverse population in a culturally competent manner.

This assignment will be a short Vlog (video blog; 2-5 minutes) that you will record yourself addressing the following:

- 1) Develop a thesis/argument regarding the interaction between culture and posture/movement.
 - a. State your thesis
 - b. Discuss specific examples from the museum exhibit(s) that support your thesis.
 - c. Compare and contrast the exhibit’s culture with your culture
- 2) Develop a thesis/argument regarding the interaction between environment and posture/movement (must use opposite posture/movement choice from #1).
 - a. State your thesis
 - b. Discuss specific examples from the museum exhibit(s) that support your thesis.
 - c. Compare and contrast the exhibit’s environment with your environment
- 3) Reflect on how this experience has changed your view or caused you to consider non-mechanical influencers of posture and/or movement in relation to culture and/or environment.

Laboratory Sessions

The laboratories in the biomechanics course are meant to give you a way to gain introductory hands-on knowledge. It is a method to provide opportunities to physically **apply** information which has been learned with lecture, discussion, or demonstration. Laboratory during the semester will be primarily utilized to teach you the PT skills of surface anatomy and palpation, as well as, posture and gait analysis. To assist with understanding of surface anatomy, you may also be drawing on each other with washable markers. We will also use laboratory sessions to discuss complex movement scenarios to enhance learning of kinesiological concepts.

Appropriate attire is typically required for labs. This will include running shorts, tee shirts (with sports bras for women). Some labs may require swimming suits (or similar attire) to facilitate palpation. Students should be appropriately dressed and prepared for lab. Laboratories examining the spine and shoulder will require removal of shirts.

Palpation

The palpation material of this course will use the Biel Trail Guide to the Body text. This text includes basic concepts of palpation, topographical contours, bony landmarks, and trails to help in understanding the connections between anatomic structures. Palpation will be conducted using a regional approach (palpation of the foot and ankle anatomy will occur along with the foot and ankle kinesiology material). **A highly valuable, instructional DVD accompanies this text. It is assumed that you have viewed the appropriate videos of palpation and performed self-palpation prior to attending and participating in lab activities. A pop quiz may be given if it is evident that students have not properly prepared for class.**

Outside/Independent Practice Time

Many of the basic skills acquired in this course will be applied in later courses and in the clinical setting. One of the best ways to learn these skills is repetition. There is only enough time in class for an introduction to the topics and skills, not guarantee mastery. This is why **outside practice is essential**. Procedures such as palpation and posture/gait/movement analyses must be practiced and repeated. The classrooms in the CGS are available for use anytime they are not scheduled, and there will be additional opportunities during practice labs. You must optimize use of these opportunities. Outside practice will lead to greater understanding and questions, which will promote discussion and increased knowledge within the framework of the course.

Lab Assignments

Lab assignments (checklists) have been created for you as a self-assessment tool and to promote outside practice. You are responsible for all the structures listed on the assignments during the skill checks. For each lab assignment, you should palpate a structure on at least 3 different people. This is the minimum and we recommend that you palpate on 8-12 different people, especially those with different body structures and of different sexes. Practice is absolutely imperative to become proficient clinicians. The questions on the labs are to get you to think and are not required to be turned in. These questions may be discussed during lab time. **Initialing of lab assignments should be performed outside of class time. This is to ensure outside practice time and give you credit for your outside work.** Lab assignments are turned in one week following the lab in which they were practiced and make up 10% of your total grade.

Course Overview:

<u>Week</u>	<u>Lec Date:</u>	<u>Lecture Topic</u>	<u>Readings & Preparation</u>	<u>Assignment/Assessment Due:</u>
1	1/19	No Class		
	1/20	Course Introduction		Anatomy Exam
	1/22	Observation of Posture & Motion	Assigned Readings (LMS)	
2	1/26	Human Posture		Quiz 1
	1/27	<u>LAB 1</u> : Basic Posture		
	1/29	<u>LAB 2</u> : Advanced Posture		
3	2/2	Introduction to Gait		Quiz 2
	2/3	<u>LAB 3</u> : Observing Basic Gait		
	2/5	<u>LAB 4</u> : Intro to Palpation <u>LAB 5</u> : Foot & Ankle Palpation	Biel Intro-Ch. 1, Intro Video Biel Ch. 7	
4	2/9	Foot & Ankle Kinesiology	Neumann: Ch. 14	Quiz 3
	2/10	<u>LAB 5</u> : continued		
	2/12	<u>LAB 6</u> : Foot & Ankle Goniometry		
5	2/16	Knee Kinesiology	Neumann: Ch. 13	Quiz 4
	2/17	<u>LAB 7</u> : Knee & Leg Palpation & Goniometry	Biel Ch. 6 & 7	
	2/19			
6	2/23	EXAM I		
	2/24	Milwaukee Public Museum		
	2/26	<u>LAB 8</u> : Hip, Thigh, & Pelvis Palpation	Biel Ch. 6	
7	3/2	Hip, Thigh, & Pelvis Kinesiology	Neumann: Ch. 12	Quiz 5
	3/3	<u>LAB 9</u> : Hip Goniometry		
	3/5	Spine Kinesiology	Neumann: Ch. 9	Quiz 6
8	3/9			
	3/10	Spring Break		
	3/12			
9	3/16	Spine Kinesiology (cont.)	Neumann: Ch. 10	
	3/17	<u>LAB 10</u> : Head, Neck, Spine & Thorax Palpation	Biel Ch. 4-5	
	3/19	<u>LAB 11</u> : Head, Neck, Spine & Thorax Goniometry	Biel Ch. 4-5	
10	3/23	EXAM II		
	3/24	Shoulder Kinesiology	Neumann: Ch. 5	Quiz 7
	3/26	<u>LAB 12</u> : Shoulder Palpation	Biel Ch. 2	
11	3/30	Shoulder Kinesiology (cont.)		
	3/31	<u>LAB 13</u> : Shoulder Goniometry	Biel Ch. 2	
	4/2	<u>LAB 14</u> : EW&H Palpation	Biel Ch. 2-3	
12	4/6	Elbow & Wrist Kinesiology	Neumann: Ch. 6 & 7	Quiz 8

	4/7	<u>LAB 15: EW&H Goniometry</u>		
	4/9	Hand Kinesiology	Neumann: Ch. 8	Quiz 9
13	4/13	Locomotion - Gait	Neumann: Ch. 15	Quiz 10
	4/14	<u>LAB 15: Gait</u>		
	4/16	<u>LAB 16: Gait</u>		
14	4/20	Locomotion - Gait		Quiz 11
	4/21	<u>LAB 17: Gait</u>		
	4/23	<u>LAB 18: Movement Analysis</u>	Assigned Readings (LMS)	
15	4/27	EXAM III		
	4/28	<u>LAB 19: Movement Analysis</u>		
Final	5/??	Kinesiology Kit Presentations		