

Second Reading

17-0-0 1/8/09

GRADUATE SCHOOL PROPOSAL COVER SHEET

Note: All changes that affect course numbers or titles and do not require action by the Graduate Council but must be submitted to the Dean of Graduate School for transmission. All other curricular proposals require the action of both Graduate Council and Faculty Council. After the required signatures have been obtained, return the proposal to the Dean of Graduate School, who will notify the proposal originator to send 35 copies of the proposal and cover sheet to the Graduate School office.

From: Physical Therapy - Randy Walker Date: 10/22/08

Title of Proposal: PHYT revise and change sequence of PHYT 503 Ther Ex and PHYT 513 Kinesiology, creating new courses in the DPT program

Proposed Starting Date: Fall, 2009

10/8/08 CHEPS Curriculum Committee approved 6-0-0

REVIEWED BY:	Date	approve	neutral
<i>J. Randy Walker</i> J. Randy Walker, PT, PhD, DPT Department Head	10/22/08 Oct 22, 2008	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<i>Mary Jurren</i> Dean	10/29/08	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Stephan Bellan</i> Dean, The Graduate School	10/30/08	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<i>Gregory Kelly</i> Director, The Graduate School		<input checked="" type="checkbox"/>	<input type="checkbox"/>
<i>Linda Otter</i> Registrar	11.9.08	<input type="checkbox"/>	<input type="checkbox"/>
<i>R. Bell</i> Provost	1/20/09	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Librarian		<input type="checkbox"/>	<input type="checkbox"/>
REVIEWED BY OTHER UNITS IMPACTED:			
<i>Eric P...</i> Reviewer	1-8-09	<input type="checkbox"/>	<input type="checkbox"/>

Grad Council

Redn Camp 1-15-09
For. Strate

TO: Registrar
Originator 1/28/09

09-0014G

CREATE 2 NEW COURSES

1. PHYT 507 - THERAPEUTIC EXERCISE
3 CREDIT HOURS - NO PRE-REQS

MEMORANDUM

2. PHYT 521 - KINESIOLOGY + APPLICATIONS OF EXERCISE
3 CREDIT HOURS - NO PRE-REQS

TO: CHEPS Curriculum Committee
FROM: Department of Physical Therapy Curriculum Committee
Date: Oct. 22, 2008
RE: Physical Therapy curriculum change

Goal of the proposal: To revise and resequence PHYT 503 Therapeutic Exercise and PHYT 513 Kinesiology, creating new courses in the DPT program

The faculty of the Physical Therapy program requests consideration of a proposal to:

1. Modify course content of PHYT 503 Therapeutic Exercise: Move the wellness unit of Therapeutic Exercise into PHYT XXX Kinesiology. This will equate to one credit hour, which then leaves Ther Ex as a three-credit hour course while increasing Kinesiology to a three-credit hour course. The Kinesiology course will be renamed to ~~Kinesiology~~ and Applications of Exercise. *3 credit hours*
2. Move PHYT XXX Therapeutic Exercise (4 hours) to the spring semester, DPT I: This will allow the therapeutic exercise interventions to follow the examination for a particular body region covered with the orthopedic courses - PHYT 523 and 529.
3. Move PHYT XXX Kinesiology & Biomechanics (3 hours) to the fall semester, DPT I: This will allow the biomechanics of a particular joint to follow the content covered in Anatomy - PHYT 510.

3 ~~X~~ Deactivate PHYT 503 and PHYT 513.

PHYT

CREATE 2 COURSES

Therapeutic Ex (3)

PHYT

Kinesiology (3)

Impact Statement

Faculty: This proposal does not change the academic year teaching load significantly for the physical therapy faculty. Dr. Dale teaches both of the courses in question; his total teaching load for the academic year is unchanged.

Students: With the change in sequence of PHYT ~~503~~ Ther Ex to the spring semester, it allows the course content to be matched with the musculoskeletal system management courses (PHYT 523 and 529). This matching of course content will better prepare students to apply the content of Ther Ex

as they learn how to treat patients with musculoskeletal dysfunction. Likewise, the move of PHYT 513 to the fall will facilitate the coordination of content from this course with PHYT 510 Anatomy. With this change, both fall and spring semesters of the first year of the DPT program will remain at 18 credit hours each.

Other Departments: Since this is an internal curricular revision, no other departments are affected.

THE UNIVERSITY OF TENNESSEE AT CHATTANOOGA
COLLEGE OF HEALTH, EDUCATION AND PROFESSIONAL STUDIES

Department of Physical Therapy

PHYT XXX Therapeutic Exercise (all sections)

Fall 2009

Instructor: Barry Dale, PhD, PT, OCS, SCS, ATC, CSCS

Office: Davenport 203

PH: 425-4046

Email: Barry-Dale@utc.edu

Instructor contact: Office hours are by appointment and posted on office doors.

No Pre-Reqs

Credit: 3 credit hrs (3 contact hrs) x 14 weeks = 42 contact hrs

Mondays & Wednesday 1-2:30pm

Course Description for PHYT XXX

Basic foundation of the knowledge and skills needed to prescribe and apply therapeutic exercise in the practice of physical therapy. The focus of this course will be on how to perform basic cardiovascular, muscular, and flexibility exercises and programming. This course will provide the foundation for therapeutic exercise units within the applied courses (orthopaedics, neurology, acute care) of the curriculum. Spring semester; year 1. *Laboratory/Studio course fee will be assessed.*

Credit hours: 3 (lecture with applied learning activities for 3 hours per week).

Method of Instruction: Teaching methods include lecture, discussion, and demonstration. Learning experiences include laboratory sessions in which classmates perform various exercises on each other, and critically analyze exercise programs and case studies. Students are expected to have read the assigned materials prior to class and are also expected to bring their books to class. Students are expected to participate in all laboratory activities. If there is a reason why a student cannot or should not participate, it is the student's responsibility to inform the instructor.

Special assistance or a special accommodation:

Attention: If you are a student with a disability (e.g. physical, learning, psychiatric, vision, hearing, etc.) and think that you might need special assistance or a special accommodation in this class or any other class, call the Office for Students with Disabilities at 425-4006 or come by the office - 110 Frist Hall.

If you find that personal problems, career indecision, study and time management difficulties, etc. are adversely impacting your successful progress at UTC, please contact the Counseling and Career Planning Center at 425-4438.

To enhance student services, the University will use your UTC email address (firstname-lastname@utc.edu) for communications. (See <http://onenet.utc.edu> for your exact address.) Please check your UTC email on a regular basis. If you have problems with accessing your email account, contact the Help Desk at 423/425-2676.

Required Text:

Kisner C and Colby SA. Therapeutic Exercise: Foundations and Techniques, 5th ed. FA Davis, Philadelphia. 2007.

Recommended Texts:

Franklin BA, ed. ACSM's Guidelines for Exercise Testing and Prescription. 7th Ed. Philadelphia: Lippincott Williams & Wilkins; 2006.

Missed work

If you miss an assignment, quiz, test, or exam because of a justifiable, excused absence as determined by

the department head, permission to make up the work at a later date must be obtained from the course instructor. Permission to take make-up quizzes, tests, or exams will not be given for an unexcused absence. Students must have laboratory clothes as described in the Physical Therapy department student handbook. Students that are not prepared for lab will be asked to leave and must make up the work on their own time.

Changes may be made at the discretion of the professor, and changes will be announced during class time.

Method of Evaluation:

Exam 1: 25%

Exam 2: 25%

Exam 3 (final): 25%

Labs/Cases/check-offs: 10%

Practical exam: 15%

Examinations will be primarily written and in multiple formats (multiple choice, short answer, true/false, matching, discussion).

Practical Examination Policy

A grade of 80% or better must be scored on each practical examination. If a grade of < 80% is achieved, the student must petition for retake of the practical examination according to the policy outlined in the student handbook. If a retake examination is allowed and successfully completed, a grade awarded for the practical examination in the final grade calculation will be 70%. If a student fails to obtain 80% on the second examination, this will result in unsuccessful completion of the course.

Students must demonstrate safe behavior in the practical. Failure to do so will lead to automatic dismissal from the practical exam.

Labs/cases/checkoffs:

Throughout the semester, students will be required to keep an exercise journal, complete lab activities that may include viewing of videos and designing exercise programs for the relatively healthy population, and completing checkoffs to assure mastery of material presented in the course.

COURSE OBJECTIVES:

Adapted from/consistent with Normative Model of Physical Therapist Professional Education, Version 2004.

Note that PHYT 503 Therapeutic Exercise and Health Promotion is a foundational sciences course covering content relative to a healthy population. Therefore, basic objectives related to patient/client management expectation are included and will serve in part as a foundation for future clinical courses. Also, objectives related to clinical sciences are not included.

NOTE: PHYT 503, section 500 (lab) is designed to support and provide practical application experiences for the objectives of PHYT 503, section 001.

Upon completion of this course, the student will be able to (relative to a healthy population):

I. Patient/Client Management Expectations

NOTE: In this section, objective numbers are consistent with numbering in the Normative Model

11.0 Screening

- 11.1 Determine when patients/clients need further examination or consultation by a physical therapist or referral to another health care professional
1. Identify individuals who have risk factors that indicate the need for a primary prevention program
 2. Describe risk factors for major health problems (cardiac disease)
 3. Select appropriate screening tools to be used with the patient/client (PAR-Q)
 4. Perform screening in a variety of practice situations, to include direct access, to guide further examination or referral
 5. describe referral sources
 6. describe processes of referral to appropriate resources
 7. describe the incidence, prevalence, and natural history of conditions and disease commonly seen by a physical therapist and uses this information in the development of community-based screening programs

12.0 Examination

- 12.1. Examine patients/clients by obtaining history from them and other resources
1. Obtain basic history effectively and efficiently
- 12.2 Examine patient/client by performing systems reviews
1. perform systems review (brief) of anatomical and physiological status of the cardiovascular/pulmonary, integumentary, musculoskeletal and neurological systems
- 12.3 Examine patient/client by selecting and administering culturally appropriate and age-related tests and measures
1. Perform selected cardiopulmonary tests and measures efficiently, and safely, providing rationale for test and measure chosen

13.0 Evaluation

- a. Evaluate data from examination to make clinical judgments
1. complete basic evaluation in efficient and timely manner
 2. employ systematic, reproducible, and interactive clinical making process using data from examination (history, systems review, tests and measures) to arrive at appropriate clinical judgments.
2. integrate findings (patient/client's overall physical function and health

- status, extent of loss of function and social considerations) from the examination to guide decision making and patient/client management.
3. Consider patient/client's level of current impairments, functional limitations and disability and the patient/client's living environment when making patient/client management decisions

14.0 Diagnosis

- a. Determine a diagnosis that guides future patient/client management

15.0 Prognosis

- a. Determine a patient/client prognosis using knowledge of epidemiology, genetics, and biophysical aspects of disease and dysfunction, and knowledge about effectiveness of interventions to determine a prognosis; modifies prognosis as necessary

16.0 Plan of care

- 16.1. Collaborate with patient/client, family members, payers and other professionals and other individuals to determine a plan of care that is acceptable, realistic, culturally competent, and patient/client centered
- 16.2. Establish a physical therapy plan of care that is safe, effective, and patient/client centered
*Plan a cardiovascular, strengthening and flexibility program for patient/client that incorporates above objectives
- 16.3 Determine patient/client goals and outcomes within available resources and specifies expected length of time to achieve goals and outcomes
- 16.4 Deliver and manage a plan of care that is consistent with legal, ethical, professional obligations and administrative policies and procedures of the practice environment.
- 16.5 Monitor and adjust the plan of care in response to patient/client status

17.0 Intervention

- 17.1 Provide physical therapy interventions to achieve patient/client goals and outcomes
 - a. Select and perform specific direct interventions to include: patient/family education and instruction in therapeutic exercise for neuromuscular reeducation, increasing flexibility/ROM, muscle strengthening, aerobic training, and anaerobic training).
 - b. Provide effective, culturally-competent instruction to patients/clients and others to achieve goals and outcomes

II. Objectives related to Foundational Sciences: Systems

A. Circulatory

1. Describe the gross anatomical components and relationships of the circulatory system
2. Demonstrate the ability to apply basic concepts of gross anatomy to the analysis of patient/client problems related to the circulatory system
3. Explain systemic factors (blood volume, hormones, mechanical influences, ect) that determine systolic and diastolic blood pressure.
4. describe the result of reduced total blood hemoglobin
5. describe the structure of the heart and trace the pathway of blood through the heart
6. summarize the pathway of blood flow through systemic and pulmonary circulation.
7. discuss some of the factors that alter the heart rate.
8. perform and record accurate blood pressure measurements of a patient/client in various positions.
9. describe why variations in blood pressure occur due to positional changes.
10. describe the process by which materials are exchanged across capillary walls.

11. discuss the forces that move fluids across capillary walls.
 12. discuss the importance of valves within the veins.
 13. discuss the arterial baroreceptors.
 14. describe the changes in arterial blood pressure that occur during exercise. Discuss the relationship between cardiac output and maximal endurance work load.
 15. evaluate blood pressure and describe what normal values are and what they mean for systolic and diastolic blood pressure.
 16. discuss blood pressure response to heavy weight training and to aerobic exercise both in the short term, and with training.
 17. discuss the potential effects of aerobic exercise for hypertensive individuals.
 18. describe the intrinsic and extrinsic factors that regulate heart rate at rest and during exercise.
 19. describe the local and neural factors that regulate blood flow at rest and during exercise.
- B. Endocrine/metabolic**
1. Describe gross anatomical components and relationships of the endocrine system
 2. Describe function of cells and cellular components of endocrine structures
 3. apply basic concepts of anatomy and physiology to analysis of patient with problems related to endocrine system
 4. Describe factors that regulate basal metabolic rate
- C. Neuromuscular**
1. describe how neural factors contribute to changes in blood pressure
 2. differentiate the following terms and analyze their function in muscle contraction (motor unit, neuromuscular junction, EPSP, IPSP, and temporal and spatial summation).
 3. discuss factors associated with neuromuscular fatigue.
 4. describe the relationships between muscle fibers, myofibrils, sarcomeres, actin, and myosin.
 5. describe the epimysium, perimysium, and endomysium.
 6. explain the sliding-filament mechanisms of muscle contraction.
 7. describe cross bridges and how they function in muscle contraction.
 8. discuss the role of troponin and tropomyosin in the formation of cross bridges.
 9. describe the sequence of events involved in excitation contraction coupling.
 10. explain the length-tension relation.
 11. discuss the load-velocity relation.
 12. describe and explain the function of joint receptors muscle spindles, GTO's).
 13. discuss the three functions of ATP in muscle fiber contraction and relaxation.
 14. describe the four major causes of fatigue (depletion of energy stores, accumulation of inhibitory metabolic waste products, dehydration, and neurological fatigue).
 15. distinguish between denervation atrophy, disuse atrophy, and hypertrophy, and describe the physiological changes that occur with each.
 16. compare the different types of skeletal muscle fibers and describe how they can be distinguished.
 17. describe the physiological and functional differences between the different types of muscle fibers.
 18. describe and give an example of the following types of muscle contractions: concentric, eccentric, isometric, isotonic, isokinetic. Describe how different muscles and muscle fibers are better suited than others to perform a particular contraction type.
- D. Respiratory**
1. describe the relative positions and identify the functions of the structures of the respiratory system.
 2. discuss the alveoli and their relationship to collateral ventilation.
 3. discuss the process of inspiration and expiration at rest and during exercise.

4. discuss the levels of oxygen and carbon dioxide in oxygenated versus deoxygenated blood.
5. discuss the roles of P_{O_2} and PCO_2 in gas exchange in the tissues.
6. describe the role of hemoglobin in oxygen transport.
7. discuss the oxygen-hemoglobin dissociation curve.
8. describe the transport of carbon dioxide.
9. describe the roles of medulla inspiratory neurons, pulmonary stretch receptors, peripheral chemoreceptors, and central chemoreceptors.
10. describe the function of carotid bodies.
11. discuss the role of carbon dioxide in ventilation.
12. compare the importance of: (a) decreased P_{O_2} (b) increased PCO_2 and (c) increased hydrogen ion as the respiratory stimulus during exercise.
13. describe the relationship between ventilation, blood lactate, and oxygen uptake during incremental exercise indicating the point for the OBLA.
14. discuss the role of the cost of ventilation with respect to limiting athletic performance. Discuss the effects of cigarette smoking.

E. Genitourinary

1. discuss the importance of aldosterone in tubular sodium reabsorption.
2. describe how the effects of aldosterone are apparently moderated.
3. describe the role of ADH in regulating extracellular volume.

F. Integumentary

1. Explain the function of skin in maintaining homeostasis
2. Discuss the relationship of skin area to heat regulation

III. Specific Objectives related to Foundational Sciences: Exercise Physiology

- A. Describe physiological responses during progressive endurance exercise across systems (musculoskeletal and neurological; cardiopulmonary, integumentary, endocrine/metabolic, renal, ect)
- B. Describe the adaptations in skeletal muscle to exercise training, and inactivity/immobilization in children, adults, and the elderly.
- C. Describe how external factors such as age, sex, temperature and altitude affect exercise performance.
- D. Describe muscle adaptation in long-distance runners and weight lifters.
- E. Describe fiber type changes as a result of exercise
- F. Describe changes in oxygen consumption, heart rate, blood pressure, blood flow to major organs, tidal volume, and breathing frequency during progressive endurance exercise
- G. Describe and analyze physiological responses of the thermoregulatory system in different environment including heat, humidity and cold
 1. explain the four physical factors that can contribute to heat gain and loss by the body
 2. discuss how the circulatory system functions in the maintenance of thermal balance.
 3. discuss fluid loss and replacement during physical activity.
 4. discuss the effects of humidity on exercise.
 5. describe the factors that make up the heat stress index.
 6. discuss the purpose of the wind chill index.
- H. Discuss heat stroke, heat intolerance with activity, and mechanisms to prevent these conditions
- I. Describe changes in insulin, glucagons, growth hormone, and cortisol during progressive endurance exercise
- J. Describe benefits of exercise on the insulin-sensitive individual and precautions with exercising the insulin-sensitive individual

- K. Recognize and interpret symptoms of hypoglycemia
- L. Describe the physiological responses to strength training
- M. Describe the physiological responses to flexibility activities
- N. Describe the physiological responses based on the influence of age, genetics, and culture on resting measurements and responses to activity
- O. Describe muscle cell anatomy (striated, skeletal, cardiac), physiology, and adaptations to training
- P. Develop exercise prescription for muscle adaptation
- Q. Describe the principles of specificity of training in relation to muscle fiber type and training effects and develop exercise prescriptions to optimize an individual's training
- R. Describe the adaptations to regular exercise of various types (aerobic or endurance training, interval or anaerobic training, muscle strengthening programs) relative to exercise specificity, effects on cardiovascular and pulmonary systems, metabolism, blood lipid levels, skeletal, connective tissue, hormonal systems; hormonal changes with exercise and aging
 - 1. Describe changes in maximal oxygen consumption, submaximal heart rate and blood pressure, and maximal and submaximal ventilation that occur as a result of endurance exercise training
 - 2. Describe changes in capillary density, oxidative enzymes, and mitochondria that occur as a result of endurance exercise training
 - 3. Discuss the effects and side effects of the use of hormones and steroids for improving muscle strength
- S. Compare and contrast diets for all populations for health, fitness and wellness
 - 1. Describe normal intake of carbohydrates, proteins, fats, vitamins, water, and minerals in the daily American diet
 - 2. Compare the differences in diet in athletes of different sports
 - 3. Describe the effects of performance enhancing supplements and the side effects of usage of supplements
 - a. explain the term ergogenic aid
 - b. give examples of substances and procedures commonly believed to offer an ergogenic benefit.
 - c. discuss the effects of anabolic steroids in building muscle mass, and in sports performance.
 - d. Discuss their mode of action and their effectiveness, and the risks involved for males and females.
 - e. discuss the ergogenic benefits and risks of taking amphetamines, caffeine, and buffering solutions.
 - f. discuss the medical use of human growth hormone, and the potential dangers to healthy athletes using this drug.
 - g. describe the procedure for red blood cell reinfusion, and why this procedure enhances endurance performance and aerobic capacity.
 - h. discuss the breathing hyperoxic gas before, during, and after exercise, and its usefulness.
 - 4. Discuss the scientific basis of weight loss, muscle gain, and diet and performance
 - 5. Discuss the effects of diet and socioeconomic facts on various segments of American society (e.g. Native Americans, African-American women, ect)
- T. Describe the adaptations to diminished activity to include effects of bed rest and immobilization of a body part on various tissues and systems (e.g. changes in maximal oxygen consumption, muscle strength, bone mineral density, and blood volume; changes in sarcomere length and number that occur with immobilization of a muscle in a shortened vs lengthened position)
- U. Describe measurement principles and accuracy of common methods to measure body composition (hydrostatic weighing, bioelectrical impedance, skinfold measurements, circumferential measurements)

- W. Describe recommended ranges for percent body fat based on age and gender
 - X. Describe advantages and disadvantages of maximal versus submaximal exercise stress tests
 - Y. Identify criteria used to determine if a diagnostic stress test is positive or negative
 - Z. Describe various methods to determine maximal force production of specified muscles
- AA. Analyze the different energy systems (ATP/CP, glycolysis, oxygen transport/electron transfer) used in different activities
 - BB. Differentiate between an appropriate exercise prescription to improve health versus to improve cardiovascular fitness
 - CC. Differentiate an exercise prescription to improve muscular torque production versus an exercise prescription to improve muscular endurance
 - DD. Design an individual exercise prescription for health, fitness, or wellness, based on exercise performance

IV. Objectives related to Foundational Sciences: Exercise (Prescription, implementation, and modeling)

- A. Analyze and implement an exercise program to build strength
 1. differentiate the use of exercise forms for building strength
 - isometric, isotonic (concentric, eccentric exercise, classical DeLorme, 1 Repetition maximum, daily adjustable progressive resistive exercise), isokinetic exercise (velocity spectrum training, modified range training, incremental velocity spectrum, ect).
 2. analyze and select equipment/means to build strength
 - body weight exercises (pull-ups, push-ups, bar dips); free weights; machines, plyometric techniques, exercise balls, elastic bands, body blade, pulley training, proprioceptive neuromuscular facilitation techniques, water
 3. demonstrate and instruct the individual in exercise techniques to build strength using
 - Frequency, intensity, duration concepts by increasing intensity, increasing weight, increasing sets and repetitions, rest interval modification, increasing frequency
 - Relationship to gravity lever arm
 - Specificity and efficiency of training
 - Periodization concepts (closed kinetic chain vs open kinetic chain, sport/activity specific, overload principle, functional activities)
 4. Demonstrate and instruct the individual in exercise techniques to build strength using
 - single joint lifts/assistance exercises; multijoint lifts/core exercises; machines; plyometric techniques, exercise balls, exercise bands, circuit training, cross training
- 4. compare PNF to traditional resistance exercises.
 5. explain the principles of PNF and apply them to patient cases.
 6. develop and implement PNF procedures specific to patient cases using appropriate activities, techniques, and elements.
 7. identify and describe elements of a PNF procedure and relate their neurophysiological rationale.
 8. demonstrate application of scapular, upper extremity, pelvic, and lower extremity diagonal patterns using each of the following techniques: rhythmic initiation, slow reversal, slow reversal hold, and slow reversal hold through increments of increasing and decreasing range.
- B. Analyze and implement an exercise program to build power
 1. Differentiate the use of exercise forms to build power

2. Analyze and select equipment/means to develop power
3. Demonstrate and instruct the individual in exercise techniques to develop power
- C. Analyze and implement aerobic/anaerobic conditioning program
 1. Analyze and select methods of training for aerobic/anaerobic conditioning (indoor and outdoor activities)
 2. Analyze and prescribe exercise parameters/ principles for aerobic/anaerobic conditioning through frequency, intensity, type and time
- D. Analyze and implement a flexibility program
 1. Differentiate the use of types of flexibility principles over the lifespan including ballistic, passive, static, dynamic, proprioceptive neuromuscular facilitation
 2. Analyze and select flexibility methods and techniques including passive exercises, combination of passive and active exercises, active assistive exercises, straps, bands, rolls
 3. Analyze and prescribe flexibility parameters through duration, frequency, and intensity concepts.
 4. Describe how peripheral joints move with respect to the convex - concave relationships of the articular surfaces.
 6. Explain the purpose of the range of motion exercise.
 7. Identify contraindications to range of motion.
 8. Perform passive and active-assistive range of motion to each peripheral joint while maintaining the proper relationships of the articular surfaces.
9. Perform passive and active-assistive range of motion to each peripheral joint using either the cardinal plane or diagonal method.
10. Interpret specific terms related to stretching such as contracture, tightness, irreversible contracture, overstretching, and selective stretching.
11. Propose the pathologic processes and clinical situations in which limitations of motion of soft tissues and joints can occur.
12. Describe the properties of contractile and noncontractile tissues that affect the application and success of stretching procedures.
13. Compare the different therapeutic techniques used to elongate muscle, including active inhibition and passive stretching.
14. Describe the indications, goals, precautions, and contraindications to stretching.
15. Discuss the correct procedures a therapist should follow when setting up and carrying out stretching exercises.
16. Identify the general principles of relaxation exercises and apply them in preparation for stretching.
17. Describe and demonstrate proper patient positioning, hand placement, and stabilization used when applying stretching techniques to the upper and lower extremities.
18. Describe and demonstrate the appropriate application of active inhibition techniques.
- E. Analyze and implement an agility, coordination and balance program
 1. Demonstrate knowledge, understanding, and application of principles for agility, coordination, and balance requiring proximal stability/distal mobility to include maintaining center of gravity over base of support and closed kinetic chain concepts
 2. Analyze and prescribe methods for developing agility, coordination, and balance to include varying the surface, varying the base of support, use of single/double extremity with the base of support, exercise balls, stability mats (discs, pads, boards, rollers), slide boards, ladders, exercise bands/cables, Pilates, Yoga
- F. Analyze and implement a program of relaxation and stress management

V.Objectives Related to Foundational Sciences: Epidemiology

- A. Analysis of demographic trends, population statistics, clinical epidemiology
 1. critically review data on trends related to health challenges nationally and globally
 2. locate and use morbidity and mortality statistics as one basis for physical

therapy programming

Specific Tests and Measures introduced in this course (Tests and measures that characterize or quantify):**Aerobic Capacity/Endurance**

- Aerobic capacity during standardized exercise test protocols
- Cardiovascular signs and symptoms in response to increased oxygen demand with exercise or activity including pressures and flow, heart rate, and rhythm and sounds; superficial vascular responses
- Pulmonary signs and symptoms in response to increased oxygen demand with exercise or activity including breath and voice sounds; gas exchange; respiratory pattern, rate, and rhythm.

Anthropometric Characteristics

- Body composition
- Body dimensions

Circulation (see aerobic capacity/endurance)

- Physiological responses to position change, including autonomic responses, central and peripheral pressures, heart rate and rhythm, respiratory rate and rhythm and ventilatory pattern.

Muscle performance

- Muscle strength, power and endurance

Range of Motion (including muscle length)

- Functional range of motion
- Joint active and passive movement
- Muscle length, soft tissue extensibility, and flexibility

Specific Therapeutic Exercise Interventions introduced in this course**Aerobic capacity/endurance conditioning or reconditioning****Flexibility exercises**

- Muscle lengthening
- Range of motion
- Stretching

Strength, power and endurance training for limbs and trunk

- Active assistive, active, and resistive exercises (including concentric, dynamic/isotonic, eccentric, isokinetic, isometric, and plyometric)
- Aquatic program
- Standardized, programmatic exercise approaches

Proposed Schedule
T : Tuesday R: Thursday

	lecture	lab
1	T: Foundational concepts of therapeutic exercise	T: Foundational concepts R: Foundational concepts
2	T: General concepts: range of motion, strengthening, and aerobic exercise; General concepts: proprioception, plyometrics	T: Review range of motion, muscle actions R: Review concepts of aerobic exercise
3	T: Specific therapeutic exercises for the shoulder Ch 3, pp 125-250	T: Review proprioception & coordination; plyometrics R: Range of motion/flexibility: scapula and glenohumeral
4	T: Treatment of shoulder conditions Ch 3, pp 125-250	T: Shoulder strengthening exercises, proprioception R: Scapula/shoulder conditions
5	T: Specific therapeutic exercises for the elbow	T: Scapula/shoulder conditions; elbow range of motion & flexibility R: Strengthening exercises, proprioception
6	T: Treatment of elbow conditions Ch 2, pp 85-123	T: Elbow/forearm conditions R: Elbow/forearm conditions
7	T: Specific therapeutic exercises for the wrist/hand	T: Range of motion/flexibility R: Strengthening exercises, proprioception
8	T: Treatment of wrist/hand conditions Ch11: pp 1-83	T: Wrist/hand conditions R: Wrist/hand conditions
	SPRING BREAK	SPRING BREAK
9	T: Specific therapeutic exercises for the ankle/foot	T: Range of motion/flexibility R: Strengthening exercises, proprioception
10	T: Treatment of ankle/foot conditions Ch. 5: pp 371-439	T: Ankle/foot conditions R: PT 630 CTD (both groups)
11	T: Specific therapeutic exercises for the knee	T: Range of motion/flexibility R: Strengthening exercises, proprioception
12	T: Treatment of knee conditions Ch. 4: pp 251-370	T: Ankle/foot and knee conditions (both groups, 1-5pm) R: knee conditions
13	T: Specific therapeutic exercises for the hip	T: Range of motion/flexibility R: Strengthening exercises,

		proprioception
14	T: Treatment of hip conditions Ch. 6	T: hip conditions R: hip conditions

**THE UNIVERSITY OF TENNESSEE AT CHATTANOOGA
COLLEGE OF HEALTH, EDUCATION AND PROFESSIONAL STUDIES
DEPARTMENT OF PHYSICAL THERAPY**

**PHYT XXX.001.500
KINESIOLOGY & APPLICATIONS OF EXERCISE
Fall**

Credit: 3 hours.

Clock hours: 3 hours per week (1 hour lecture, 2 hours laboratory).

Schedule: Monday, Wednesday, Friday (8:30 - 9:20)

Faculty: R. Barry Dale PT, PhD, ATC, SCS, OCS, CSCS

No Pre-reqs

Course description: An introduction to kinesiology through the study of biomechanics, including statics and dynamics, joint kinematics, and related aspects of muscle mechanics and physiology. Emphasis is on the importance of mechanical principles in relation to analysis of the human body at rest and in motion, in both normal and selected pathological conditions. The course will include an introduction to motor control. Students will also learn about role of the physical therapist in prevention and the promotion of health, wellness and fitness and the concepts of exercise prescription for the healthy and individuals with risk factors for various diseases. Fall semester, year 1.

Course objectives: At the completion of the course, the student will be able to:

1. Examine the relationships between osteokinematics, arthrokinematics, and muscle function across the lifespan.
2. Apply principles of biomechanics to describe joint function.
3. Describe and evaluate the components of motion and muscle function to analyze movement specific to sport, recreation, and activity.
4. Solve problems relating to force production in various activities and/or environments.
5. Apply biomechanical principles to promote or deter movement and movement dysfunction.
6. Describe the biomechanics of static and dynamic posture.
7. Analyze which muscles must be active during various functional activities (e.g., the muscles used during the swing phase of gait).
8. Calculate the maximal ground reaction force that occurs during ambulation.
9. Determine where the center of gravity occurs with various postures and when stability is not possible.
10. Calculate the moments created by contraction of muscles and the compressive load those muscles place on joint surfaces.

11. Calculate the loads that are applied to tissues of the musculoskeletal system during functional activities.
12. Describe biomechanical principles needed to mobilize joints correctly.
13. Predict the factors that influence velocity, force, and components of skeletal muscle contraction.
14. Describe mechanisms by which muscles remodel to match function.
15. Identify and evaluate the mechanisms of muscle adaptation that occur as a result of exercise training or lack of training.
16. Judge which components of motion and factors influencing that motion and movement in specific sport and recreation activities.
17. Describe normal variations of joints and muscle function when observing movement patterns.
18. Apply a thorough understanding of the translational and rotational movements of a joint.
19. Evaluate the effects of altered joint range of motion (ROM) on a given functional activity.
20. Evaluate fellow students and patients for proper use of correct body mechanics.
21. Compare and contrast joint and tissue mechanics with the design, fabrication (where appropriate), and application of orthoses and prostheses to facilitate appropriate functional outcomes.
22. Apply knowledge of joint mechanics and physical principles in the prescription and application of assistive devices.
23. Describe the components of well-structured physical exercise program.
 - a. Describe the recommendations for aerobic, musculoskeletal strength and flexibility, and balance activities for the healthy population and also for individuals with risk factors for various diseases.
 - b. Describe the components of each of the aforementioned types of exercise.
24. Develop an exercise prescription for the healthy population and for individuals with risk factors for various diseases.

Attendance and make-up policies: governed by Physical Therapy Program. Any unexcused absence will result in 5 points (per episode) being deducted from your final grade.

Late turn-in of assignments: One letter grade penalty for all late submissions.

Evaluation:

Exam 1	20% of Final Grade
Exam 2	20% of Final Grade
Exam 3	20% of Final Grade
Final Exam (comprehensive)	30% of Final Grade
Lab Reports and homework	10% of Final Grade

Required reading:

1. Oatis, C.A. (2004). Kinesiology, The Mechanics & Pathomechanics of Human Movement. Philadelphia: Lippincott.
2. Whittle, M.W. (2001): Gait analysis: an introduction (3rd edition). Oxford: Butterworth-Heinemann.
3. Franklin BA, ed. ACSM's Guidelines for Exercise Testing and Prescription. 7th Ed. Philadelphia: Lippincott Williams & Wilkins; 2006.

Required equipment: Calculator with square root and trig. functions (\sin , \cos , \tan , \sin^{-1} , \cos^{-1} , \tan^{-1}).

Teaching and learning methods: Lecture format, combined with short collaborative group learning projects in class, and supported by laboratory sessions on biomechanical mathematics, levers and joint forces, gait analysis (elementary and video analysis), and biomechanics of exercise and exercise equipment (nautilus).

Reasonable accommodation:

Attention: If you are a student with a disability (e.g. physical, learning, psychiatric, vision, hearing, etc.) and think that you might need special assistance or a special accommodation in this class or any other class, call the Office for Students with Disabilities at 425-4006 or come by the office - 110 Frist Hall.

If you find that personal problems, career indecision, study and time management difficulties, etc. are adversely impacting your successful progress at UTC, please contact the Counseling and Career Planning Center at 425-4438.

Honesty:

Students are expected to comply with university policies regarding academic honesty. Any episode of dishonesty will be handled according to university policy.

week	lecture
1	Exercise prescription
2	Exercise prescription
3	Exercise prescription
4	Exercise prescription
5	Biomechanics: terms and concepts
6	Biomechanics of materials
7	Shoulder
8	Elbow and hand
9	Hip
10	Knee
11	Ankle and foot
12	Spine
13	Gait
14	Gait