

Physical Therapists as Exercise Experts with Aging Adults Curriculum Guidelines
Content in Professional Physical Therapist Education
Section on Geriatrics - APTA
2009

Background

Exercise is a powerful intervention for the mediation of the effects of chronic disease and functional disability. No other intervention has been shown to be as effective in addressing deficiencies in muscle mass, bone mineral content, muscle strength, dynamic balance, overall physical activity level, gait speed and physical function.

With a minimum of 25% of older Americans classified as obese and almost 50% reporting sedentary lifestyles, it is imperative that effective strategies for exercise are developed and implemented. Physical therapists are the ideal professionals to promote, guide, and manage the exercise activities and efforts of America's aging adults. Physical therapists are experts in movement and exercise and have a thorough knowledge of pathology and its effects on all systems, and thus are the appropriate professionals to design optimal exercise prescriptions for reducing the patient's/client's impairments and improving functional levels.

These recommendations for curricular content are the result of the concerted effort by the Section on Geriatrics Task Force on Promoting Physical Therapists as Exercise Experts for Aging Adults. These recommendations may be used as a stand-alone instructional set or as part of other courses to educate the professional entry-level physical therapist student about the "power" and effectiveness of exercise that can positively influence the health and well being of America's aging adults. They follow the terminology and format (for tests and measures and procedural interventions) in the "Guide to Physical Therapist Practice" and the organization of "The Normative Model of Physical Therapist Professional Education."

Evidence for Exercise Role for the Aging Adult

Overwhelming evidence exists for the role of resistance exercise and its ability to maintain and improve functional abilities throughout the continuum of life. The role of resistance exercise has been primarily documented since the 1980's. Since that time, the evidence is quite clear on the necessity of using appropriate intensities and modes to effectively improve function in the aging adult. There is also clear evidence of the safety of high-intensity resistance exercise programs for aging adults especially when supervised by a trained individual, such as a physical therapist. Additional information about exercise and aging adults can be found at the Section on Geriatrics web site (www.geriaticsppt.org).

**Exercise Examination and Interventions for Aging Adults
Recommendations for Professional Physical Therapist Curricula**

Foundational Science Matrix

Primary Content	Terminal Behavioral Objectives After the completion of the content, the student will be able to...	Example Instructional Terminal Objectives for the Classroom
Physiology of Normal Aging		
<ul style="list-style-type: none"> • Physiology of aging <ul style="list-style-type: none"> ○ Cardiovascular ○ Pulmonary ○ Muscular ○ Skeletal ○ Neurological ○ Integumentary ○ Endocrine/Hormonal ○ Genito-urinary 	<ul style="list-style-type: none"> • Explain the structure and function as it relates to aging of these systems • Identify complications that may result from changes with aging for each system • Describe the functions of aging endocrine/hormonal systems • Identify structural components of the aging genito-urinary system 	<ul style="list-style-type: none"> • After completion of this content, the student should be able to prepare an exercise intervention for the older adult taking into consideration all of the normal physiological changes that have occurred in prior years. <p>Note: As distinguished from inactivity changes</p>
Behavioral Sciences		
<ul style="list-style-type: none"> • Possible concerns <ul style="list-style-type: none"> ○ Quality of life issues ○ Effects of reduced mobility and isolation ○ Effects of chronic illness ○ Caregiver stress ○ Dependence on caregivers ○ Health care expenses and lost wages ○ Occupational and lifestyle changes ○ Palliative care 	<ul style="list-style-type: none"> • Discuss the various psychological issues involved in aging (e.g., ageism, depression, suicide) • Discuss the role of reduced mobility and isolation on aging individuals • Identify possible effects of chronic illness including stress, anger, depression, financial stress, isolation, and dependence on a patient's/client's ability to deal with aging • Discuss possible roles of the physical therapist in caring for a patient/client with a chronic condition • Discuss how to address goals within the plan of care for patients dependent on caregivers • Identify sources of support including referral to other health professionals and/or community organizations 	<ul style="list-style-type: none"> • After completion of this content, using mock patient/client scenarios, the student should be able to discuss possible psychological issues patients/clients might encounter with aging. <p>Note: As distinguished from inactivity changes</p>

Clinical Sciences Matrix

Primary Content	Terminal Behavioral Objectives After the completion of the content, the student will be able to...	Example Instructional Terminal Objectives for the Classroom
Examination – Patient/Client History		
<p>Add the following additional items to the specific areas in the Patient/Client History Form found in APTA's <i>Guide to Physical Therapist Practice</i></p> <p>General Health Status</p> <ul style="list-style-type: none"> • Have you unintentionally lost 10 pounds or more over the last year? <p>Medical/Surgical History – Have ever had:</p> <ul style="list-style-type: none"> • Lightheadedness • Dizziness • Sensation of spinning or vertigo (for example, while going from lying to sit, sit to stand, or during head movements) • Do you have any visual problems? • Have you had any eye surgery? • Do you wear glasses? • When was your last eye examination? • Do you have any hearing difficulties? • Do you use a hearing aid? • When was your last 	<ul style="list-style-type: none"> • Explain the significance of the addition of each of these areas to the patient/client history • Identify benefits to understanding the additional items to the history of an aging patient/client • Discuss issues surrounding the patient's/client's level of function and mobility and how these factors can influence their quality of life and readiness to exercise • Explain how balance, eye, and ear difficulties may influence intervention choices for the aging patient/client • List personal sensory barriers to exercise in the aging adult 	<ul style="list-style-type: none"> • After completion of this content, the student should be able to discuss possible barriers to exercise in both young (student) and older populations. • After completion of this content, the student should be able to create 2 questions that would be included in a history of a patient/client that wants/needs to start an exercise program and consider possible barriers to exercise. • After completion of this content, the student should be able to determine the potential effects of relevant medical/surgical history on future exercise intervention for the frail older adult.

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<p>hearing examination?</p> <p>Functional Status/Activity Level</p> <ul style="list-style-type: none"> • Have you fallen in the last year? If so, how many times? • Do you have a fear of falling? • How many times did you leave your home within the last week? <ul style="list-style-type: none"> ○ Daily ○ 3x/week ○ 1x/week ○ Other • Do you need assistance to leave your home? <ul style="list-style-type: none"> ○ Assistive device and type ○ Human assistance <p>Other Clinical Tests</p> <ul style="list-style-type: none"> • Bone Mineral Density • Serum vitamin D level 		
Examination – Systems Review		
<p>Add the following areas to the Systems Review found in the template in <i>APTA's Guide to Physical Therapist Practice</i></p> <p>Musculoskeletal System</p> <ul style="list-style-type: none"> • Height in typical standing posture • Height in conscious erect posture 	<ul style="list-style-type: none"> • Describe and understand genitourinary changes that can impede patient/client quality of life 	<ul style="list-style-type: none"> • After completion of this content, the student should be able to list how each of the possible GU changes may impact a person's desire or ability to exercise.

Primary Content	Terminal Behavioral Objectives After the completion of the content, the student will be able to...	Example Instructional Terminal Objectives for the Classroom
<ul style="list-style-type: none"> Maximal height during lifetime <p>Genito-urinary System Review</p> <ul style="list-style-type: none"> Bladder <ul style="list-style-type: none"> Urinary frequency Urgency Incontinence Reduced force of stream Difficulty initiating Dysuria Color Bowel <ul style="list-style-type: none"> Changes in regularity 		
Examination – Tests and Measures		
<ul style="list-style-type: none"> Demographics of physical activity Consequences of physical inactivity and bed rest Significance of slippery slope of aging How physical activity and inactivity relate to prognosis of functional abilities and recovery 	<ul style="list-style-type: none"> Discuss the significance of an aging individual's activity history and co-morbidities on prognostic indicators of functional abilities, co-morbidities, and mortality 	<ul style="list-style-type: none"> After completion of this content, using the social and physical histories the student should be able to predict functional abilities considering the slippery slope of aging, risks for future functional decline, and potential willingness to participate in a physical activity/exercise program. After completion of this content, the student should be able to describe the impact of bed rest and deconditioning on the function of the body systems and list which consequences are remediable with exercise.
<ul style="list-style-type: none"> Purpose of traditional measures, such as MMT Information that traditional measures provide 	<ul style="list-style-type: none"> List the limitations of standard impairment measures 	<ul style="list-style-type: none"> After completion of this content, the student should be able to show examples of limitations of traditional impairment measures and relationship to function (example, does 4/5 tell you if a patient can get up out of chair?).

Primary Content	Terminal Behavioral Objectives After the completion of the content, the student will be able to...	Example Instructional Terminal Objectives for the Classroom
<ul style="list-style-type: none"> • Clinimetric properties of tests and measures <ul style="list-style-type: none"> ○ Reliability ○ Validity ○ Sensitivity ○ Specificity ○ Likelihood ratios (nomogram) ○ Minimally clinically important difference (MCID) vs. minimum detectable change (MDC) 	<ul style="list-style-type: none"> • Choose appropriate functional tests for specific individuals based on the tools' clinimetric properties and the patient's/client's attributes 	<ul style="list-style-type: none"> • After completion of this content, the student should be able to calculate likelihood ratios using a nomogram. • After completion of this content, the student should be able to make decisions of the "best" test. • After completion of this content, the student should be able to apply clinimetric information in selecting a test and measure. • After completion of this content, the student should be able to use MCID for documenting clinically meaningful improvement in an objective test.
<p>Relevant tests and measures</p> <ul style="list-style-type: none"> • For each of the relevant tests and measures below, detail <ul style="list-style-type: none"> ○ Purpose ○ Equipment ○ Population (setting) ○ Clinimetrics ○ Scoring ○ Advantages ○ Disadvantages ○ Time to complete ○ Correlations with impairments <p>Aerobic Capacity/Endurance</p> <ul style="list-style-type: none"> • Timed walk tests • 2 minute step test • Seated step test <p>Anthropometric</p> <ul style="list-style-type: none"> • Waist circumference • Waist /hip ratio <p>Gait, Locomotion, and</p>	<ul style="list-style-type: none"> • Perform specific, functional measures based on the test and measure's characteristics • Determine precautions and contraindications of a test for an individual, based on specific co-morbid conditions (example, caution with Chair sit and reach with osteoporosis) • Interpret results of questionnaires • Perform community screenings • Determine use of particular form for community-dwelling aging adults 	<ul style="list-style-type: none"> • After completion of this content, the student should be able to achieve a basic competency in technique and scoring. • After completion of this content, the student should be able to review videotapes of "normal and impaired" individuals to practice scoring. • After completion of this content, the student should be able to understand the ceiling effect of the TUG test and compare it with eight foot walk test • After completion of this content, the student should be able to screen aging adults (retirement centers, community screening activities) and make clinical hypotheses regarding function. • After completion of this content, the student should be able to analyze videos of community-dwelling aging individuals performing tests and then determine their function.

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<p>Balance</p> <ul style="list-style-type: none"> • Berg Balance Score (BBS) • Dynamic Gait Index (DGI) • Four Square Step Test • Fullerton Balance Scale • Functional Reach • Gait Speed • One Leg Stance Test (OLST) • Timed Up and Go (TUG) <p>Motor Function</p> <ul style="list-style-type: none"> • Toe Tap Test <p>Muscle Performance</p> <ul style="list-style-type: none"> • Arm Curl • Chair Rise Tests • Dorsiflexion strength (dynamometer) • Grip Strength • Standing Heel Raise • Supine Hip Extension Test <p>Posture</p> <ul style="list-style-type: none"> • Rib-pelvis distance • Wall-occiput distance <p>Range of Motion</p> <ul style="list-style-type: none"> • Back scratch • Chair sit and reach <p>Self-care, Home Management, Work, Community, and Leisure</p> <ul style="list-style-type: none"> • Barthel index <p>Multipurpose Test Batteries</p> <ul style="list-style-type: none"> • Elderly Mobility Scale • Physical Performance Test (also Modified PPT) 		

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<ul style="list-style-type: none"> Short Physical Performance Battery <p>Questionnaires</p> <ul style="list-style-type: none"> Activities-specific Balance Confidence Scale (ABC) Falls Efficacy Scale Self Efficacy Measures 		
Evaluation, Diagnosis, Prognosis, and Plan of Care		
<ul style="list-style-type: none"> Reimbursable Medicare codes Short-term and long-term goals using Medicare-focused documentation requirements Community-based exercise programs 	<ul style="list-style-type: none"> Design plan of care with specific interventions based on findings Create appropriate short- and long-term goals including post-discharge requirements for optimal community living Using knowledge of functional and impairment measures, apply critical thinking to create optimal, reimbursable intervention strategies 	<ul style="list-style-type: none"> After completion of this content, the student should be able to view videos and develop prioritized and coded (CPT) interventions with short- and long-term functional based goals. After completion of this content, the student should be able to give examples of community based programs.
Interventions – Therapeutic Exercise – Aerobic Capacity/Endurance Training		
<ul style="list-style-type: none"> Cardiovascular/ pulmonary physiological responses and effects of aging on aerobic exercise performance Goals and indications for aerobic program (purpose, when need endurance, how to distinguish need for endurance vs. strength, distinguishing difference between motor learning and improvements in true aerobic capacity) 	<ul style="list-style-type: none"> Demonstrate knowledge of aerobic exercise principles when applied to aging adults incorporating cardiovascular/pulmonary principles, safety, and effectiveness Analyze and implement an aerobic/anaerobic/endurance conditioning or reconditioning program 	<ul style="list-style-type: none"> After completion of this content, the student should be able to detail aerobic exercise principles. After completion of this content, the student should be able to compare and contrast aerobic training programs for younger and aging patient/client populations distinguishing differences and providing rationale for those differences. After completion of this content, the student should be able to analyze and select methods of training for aging adults for aerobic/anaerobic/endurance conditioning or reconditioning to include: <ul style="list-style-type: none"> Outdoor <ul style="list-style-type: none"> Walking and wheelchair propulsion

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		<ul style="list-style-type: none"> ▪ Running ▪ Jogging ▪ Bicycling ▪ Cross country skiing ○ Indoor <ul style="list-style-type: none"> ▪ Stair climbing ▪ Steps ▪ Bikes – upright and recumbent ▪ Cross country skiers ▪ Treadmills ▪ Cross trainers/ellipticals ▪ Arm cranks ▪ Rowers ▪ Swimming/water aerobics ▪ Jump ropes ○ Class type activities (i.e., low impact, high impact, dance aerobics) ○ Circuit training ○ Cross training ○ Interval training ○ Detraining and tapering ○ Threshold runs ○ Peaking threshold runs ○ Functional activities ● After completion of this content, the student should be able to identify underlying impairments resulting in decreased aerobic capacity. ● After completion of this content, the student should be able to take vital signs when the patient/client is static and moving.
<ul style="list-style-type: none"> ● Medication influences on aerobic exercise response 	<ul style="list-style-type: none"> ● Make clinical decisions about influence of medications on aerobic exercise response and prognosis 	<ul style="list-style-type: none"> ● After completion of this content, the student should be able to incorporate effects of beta-blockers on exercise and activity modification

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<ul style="list-style-type: none"> • Disease specific influences on aerobic capacity 	<ul style="list-style-type: none"> • Incorporate specific clinical practices for patients on oxygen 	<p>for blunted exercise response into a case study.</p> <ul style="list-style-type: none"> • After completion of this content, the student should be able to incorporate effect of oxygen use into a case of a patient with COPD Stage 3. • After completion of this content, the student should be able to detail how oxygen saturation is used to monitor exercise response into a case of a patient with congestive heart failure.
<ul style="list-style-type: none"> • Aerobic exercise parameters <ul style="list-style-type: none"> ○ Intensity <ul style="list-style-type: none"> • Borg Scale of Perceived Exertion • Objective measures ○ Mode <ul style="list-style-type: none"> • Specificity ○ Duration ○ Frequency ○ Precautions ○ Contraindications 	<ul style="list-style-type: none"> • Incorporate parameters in an effective, safe aerobic program • Use results of endurance and aerobic capacity testing to establish appropriate exercise dose 	<ul style="list-style-type: none"> • After completion of this content, the student should be able to analyze and prescribe exercise parameters/principles for aerobic/anaerobic/endurance conditioning or reconditioning through: <ul style="list-style-type: none"> ○ Frequency, intensity, and duration concepts • After completion of this content, the student should be able to perform a 2-minute step test, analyze results, and establish the exercise dose considering patient specific findings and attributes. • After completion of this content, the student should be able to design an aerobic exercise program for an aging adult using the parameters of intensity, mode, duration, and frequency. • Note: Student should be able to access Hooked on Evidence – Clinical Scenarios
<ul style="list-style-type: none"> • Apply standards of overload 	<ul style="list-style-type: none"> • Progress program safely and effectively • Recognize necessity of applying overload to generate improvements in aerobic capacity 	<ul style="list-style-type: none"> • After completion of this content, the student should be able to progress a walking program using overload principles.
Interventions – Therapeutic Exercise – Balance, Coordination, and Agility Training		
<ul style="list-style-type: none"> • Physiological responses 	<ul style="list-style-type: none"> • Demonstrate knowledge of balance, coordination, 	<ul style="list-style-type: none"> • After completion of this content, using videos,

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and effects of aging on balance, coordination, and agility <ul style="list-style-type: none"> • Goals and indications for balance, coordination, and agility program 	and agility exercise principles when applied to aging adults incorporating muscle performance, range of motion, vestibular, somatosensory, and visual impairments	the student through should be able to identify impairments causing imbalance.
<ul style="list-style-type: none"> • Impairments relating to balance, coordination, and agility 	<ul style="list-style-type: none"> • Use results of balance, coordination, and agility tests to establish appropriate exercise programs 	<ul style="list-style-type: none"> • After completion of this content, the student should be able to analyze videos for results of balance, coordination, and agility tests for possible impairments.
<ul style="list-style-type: none"> • Medication influences on balance, coordination, and agility 	<ul style="list-style-type: none"> • Make clinical decisions about influence of medications on balance, coordination, and agility response and prognosis 	<ul style="list-style-type: none"> • After completion of this content, the student should be able to incorporate the influence of psychotropic drugs into a case study. • After completion of this content, the student should be able to choose out of list of medications those that may affect balance, coordination, and agility.
<ul style="list-style-type: none"> • Disease specific influences on balance, coordination, and agility 	<ul style="list-style-type: none"> • Incorporate specific disease presentations into program of balance, coordination, and agility 	<ul style="list-style-type: none"> • After completion of this content, the student should be able to understand through case studies of patients with Parkinson's disease, BPPV, kyphosis, etc. the influence of the disease on balance, coordination, and agility.
<ul style="list-style-type: none"> • Balance, coordination, and agility exercise and parameters <ul style="list-style-type: none"> ○ Intensity ○ Mode ○ Frequency ○ Duration ○ Specificity ○ Motor learning principles 	<ul style="list-style-type: none"> • Analyze and implement an agility, coordination, and balance program • Incorporate parameters in an effective, safe manner for balance, coordination, and agility training program 	<ul style="list-style-type: none"> • After completion of this content, the student should be able to demonstrate knowledge, understanding, and application of principles for agility, coordination, and balance requiring proximal stability/distal mobility for aging adults by: <ul style="list-style-type: none"> ○ Maintaining the center of gravity over the base of support ○ Closed kinetic chain concepts ○ Sport/activity specific movements • After completion of this content, the student should be able to analyze and prescribe methods for developing agility, coordination,

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		<p>and balance for aging adults by:</p> <ul style="list-style-type: none"> ○ 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, beams, balls, rollers ○ Slide boards ○ Ladders ○ Eyes closed versus eyes open ○ Exercise bands/cables ○ Functional activities ○ CAM (i.e., Yoga, Tai Chi, Pilates) <ul style="list-style-type: none"> ● After completion of this content, the student should be able to incorporate specificity into a balance-training program. ● After completion of this content, the student should be able to design balance, coordination, and agility training programs using the parameters of intensity, mode, frequency, duration, and specificity.
<ul style="list-style-type: none"> ● Challenge for changes in condition (adapt vs. challenge concept) 	<ul style="list-style-type: none"> ● Progress program safely and effectively ● Recognize necessity of applying challenge to generate improvements 	<ul style="list-style-type: none"> ● After completion of this content, the student should be able to modify balance, coordination, and agility training programs to incorporate change in personal and/or environmental conditions.
Interventions – Therapeutic Exercise – Body Mechanics and Postural Stabilization		
<ul style="list-style-type: none"> ● Effects of body mechanics on static and dynamic postures 	<ul style="list-style-type: none"> ● List situations when body mechanics and lack of postural stabilization adversely impact static and dynamic postures 	<ul style="list-style-type: none"> ● After completion of this content, using videos, the student should be able to discuss patient/client examples of different static and dynamic postures.
<ul style="list-style-type: none"> ● Effect of muscle length and joint restriction on static and dynamic postures 	<ul style="list-style-type: none"> ● Create an appropriate exercise program for improvement or maintenance of required posture to accomplish functional tasks efficiently and 	<ul style="list-style-type: none"> ● After completion of this content, using videos, the student should be able to demonstrate knowledge, understanding, and application of

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<ul style="list-style-type: none"> Strength, power, and endurance principles related to static and dynamic postures 	safely	<p>principles for body mechanics and postural stabilization for aging adults by:</p> <ul style="list-style-type: none"> Maintaining correct dynamic postural alignment and position during all self-care, home management, work, community, or leisure actions, tasks, or activities Maintaining correct static postural alignment and position during all self-care, home management, work, community, or leisure actions, tasks, or activities <ul style="list-style-type: none"> After completion of this content, using videos, the student should be able to analyze and prescribe methods for developing body mechanics and postural stabilization for aging adults by: <ul style="list-style-type: none"> Appropriately utilizing information for strength, power, aerobic/endurance, flexibility, balance, coordination, and agility training in order to achieve correct body mechanics and postural stabilization Body mechanics training Postural control training Postural stabilization activities Posture awareness training Dexterity and coordination training during work Functional performance during work actions, tasks, or activities After completion of this content, the student should be able to identify patient/client examples of muscle length and joint restriction impairments and their effect on posture.

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Interventions – Therapeutic Exercise – Flexibility Exercises		
<ul style="list-style-type: none"> • Collagen changes with age and inactivity • Range of motion needed for functional activity 	<ul style="list-style-type: none"> • Compare and contrast effective exercise techniques for muscle lengthening 	<ul style="list-style-type: none"> • After completion of this content, the student should be able to design a program that has a goal to improve the length of hamstrings (e.g., apply stretch for 60 seconds rather than 30 seconds).
<ul style="list-style-type: none"> • Limiting factor(s) of joint vs. muscle length restrictions • Possible causes of each type of restriction 	<ul style="list-style-type: none"> • Differentiate between joint and muscle length restrictions 	<ul style="list-style-type: none"> • After completion of this content, the student should be able to determine the cause of lack of heel strike between deficits in ankle ROM and deficits in gastrocnemius and soleus muscles length.
<ul style="list-style-type: none"> • Components of flexibility program and parameters <ul style="list-style-type: none"> ○ Intensity ○ Mode ○ Duration ○ Frequency 	<ul style="list-style-type: none"> • Appropriately apply specific components of flexibility program to various patient findings 	<ul style="list-style-type: none"> • After completion of this content, the student should be able to differentiate the use of types of flexibility principles for aging adults including: <ul style="list-style-type: none"> ○ Ballistic ○ Passive ○ Static ○ Dynamic ○ Proprioceptive Neuromuscular Facilitation (PNF) • After completion of this content, the student should be able to analyze and select flexibility methods and techniques including: <ul style="list-style-type: none"> ○ Passive exercises ○ Combination of passive and active exercises ○ Active-assisted exercises ○ CAM - (i.e., Pilates, Yoga) ○ Straps, bands, etc. ○ Functional activities • After completion of this content, the student should be able to analyze and prescribe flexibility parameters through: <ul style="list-style-type: none"> ○ Intensity, mode, duration, and

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		<p>frequency concepts</p> <ul style="list-style-type: none"> • After completion of this content, the student should be able to determine functional task interventions for joint restrictions affecting a particular functional task. • After completion of this content, the student should be able to determine appropriate technique(s) to address muscle length restriction using specific cases that demonstrate muscle length impairments affecting functional tasks.
Interventions – Therapeutic Exercise – Gait and Locomotion Training		
<ul style="list-style-type: none"> • Gait changes with age and physical activity • Likely impairments affecting typical gait in aging adults <ul style="list-style-type: none"> ○ ROM ○ Balance ○ Fear of falling ○ Strength 	<ul style="list-style-type: none"> • Demonstrate application of effective exercise and motor learning principles for gait and locomotion training • Analyze and implement a program of gait and locomotion training 	<ul style="list-style-type: none"> • After completion of this content, the student should be able to demonstrate knowledge, understanding, and application of principles for gait and locomotion training for aging adults by: <ul style="list-style-type: none"> ○ Achieving static balance during functional activities ○ Achieving dynamic balance during functional activities ○ Achieving gait and locomotion on and in different physical environments • After completion of this content, the student should be able to analyze and prescribe methods for developing gait and locomotion for aging adults such as: <ul style="list-style-type: none"> ○ Appropriate utilization of all information for strength, power, aerobic/endurance, balance, coordination, agility, and postural stabilization in order to achieve gait and locomotion ○ Gait training ○ Perceptual training ○ Wheelchair maneuverability and mobility • After completion of this content, the student should be able to understand that “gait training” involves integration of the principles

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		<p>of intensity, motor learning, and specificity</p> <ul style="list-style-type: none"> • After completion of this content, the student should be able to incorporate the principles of exercise progression into the functional task of walking.
Interventions – Therapeutic Exercise – Strength, Power, and Endurance Training		
<ul style="list-style-type: none"> • Physical stress theory applications of overload and specificity to muscle strength, power, and endurance training programs <ul style="list-style-type: none"> ○ Intensity required for hypertrophy ○ Mechanisms to enhance performance ○ Task specific considerations (power, muscle contraction, muscle isolation, form) 	<ul style="list-style-type: none"> • Demonstrate knowledge of muscle strength, power, and endurance principles when applied to aging adults incorporating specific muscle type, function, and task performed • Analyze and implement an exercise program to build strength 	<ul style="list-style-type: none"> • After completion of this content, the student should be able to identify prime movers and type of muscle contraction required in specific tasks. • After completion of this content, the student should be able to differentiate the use of exercise forms over the life span for building strength using: <ul style="list-style-type: none"> ○ Isometric exercise ○ Isotonic (concentric, eccentric) exercise - classical DeLorme, Oxford, 1 Repetition RM) • After completion of this content, the student should be able to analyze and select equipment/means to build strength using: <ul style="list-style-type: none"> ○ Body weight exercises – wall slides, plank hold ○ Free weights - barbells, dumbbells, cuff weights, vest weights ○ Weight training machines ○ Plyometric techniques ○ Exercise balls ○ Elastic bands, tubing ○ Body blade ○ Pulley training ○ Proprioceptive neuromuscular facilitation techniques ○ Water – including water dumbbells and boots

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		<ul style="list-style-type: none"> ○ CAM - (e.g., Pilates, Yoga, Tai Chi) ● After completion of this content, the student should be able to analyze and prescribe exercise parameters/principles to build strength using: <ul style="list-style-type: none"> ○ Frequency, intensity, and duration concepts by <ul style="list-style-type: none"> -Increasing intensity -Increasing weight -Increasing repetitions -Rest interval modification -Increasing frequency ○ Relationship to gravity ○ Lever arm ○ Specificity and efficiency of training ○ Periodization concepts <ul style="list-style-type: none"> -Closed kinetic chain versus open kinetic chain -Sport/activity specific -Overload principle -Functional activities ● After completion of this content, the student should be able to demonstrate and instruct the individual in exercise techniques to build strength using: <ul style="list-style-type: none"> ○ Assistance exercises ○ Core exercises ○ Machines ○ Plyometric techniques ○ Exercise balls ○ Exercise bands ○ Circuit training ○ Cross training ● After completion of this content, the student should be able to differentiate the use of

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		<p>exercise forms for aging adults for developing power including:</p> <ul style="list-style-type: none"> ○ Isotonic (concentric, eccentric) exercise. ○ Isokinetic exercise ○ Plyometric techniques <ul style="list-style-type: none"> ● After completion of this content, the student should be able to analyze and select equipment/means to develop power using: <ul style="list-style-type: none"> ○ Body weight exercises ○ Plyometric techniques ○ Water ● After completion of this content, the student should be able to analyze and prescribe exercise parameters/principles for developing power using: <ul style="list-style-type: none"> ○ Frequency, intensity, and duration concepts <ul style="list-style-type: none"> -Increasing intensity -Increasing weight -Increasing repetitions -Rest interval modification -Increasing frequency ○ Lever arm principles ● Note: Example using sit to stand task <ul style="list-style-type: none"> ○ Intensity: Alter the task conditions (height of chair, feet position, amount of arm assist, etc.) so the patient is able to complete the minimum number of repetitions to exercise at a given intensity (e.g., 8 repetitions for 80% of 1 RM. Make the conditions more challenging if the patient can perform 12 or more repetitions). ○ Mechanisms to enhance

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		<p>performance: consider goals of performance vs. transfer of training and apply appropriate motor learning principles (e.g., to enhance practice, have patient perform sit to stand until fatigue vs. goal of transfer that requires random practice using different surfaces, heights, and speed).</p> <ul style="list-style-type: none"> ○ Task specific considerations to improve stand to sit, (type and speed of muscle contractions). ● Note: Example performing isotonic elbow flexion <ul style="list-style-type: none"> ○ Intensity: Choose an amount of weight that the patient can lift slowly, through full ROM, with good form and technique, the minimum number of repetitions to exercise at a given intensity (e.g., 12 repetitions for 50% of 1 RM. Increase the weight if the patient can perform 20 or more repetitions).
<ul style="list-style-type: none"> ● Length of time for hypertrophy, power, and endurance to occur ● Conditions necessary for hypertrophy, power, and endurance to occur over time ● Mechanisms for increasing complexity of task (decreasing stability of surface, multi-planar, etc.) 	<ul style="list-style-type: none"> ● Progress strength, power and endurance training programs safely and effectively to accomplish goals 	<ul style="list-style-type: none"> ● After completion of this content, the student should be able to modify above programs (e.g., sit to stand) to incorporate change in personal and/or environmental conditions ● Note: Example of intensity progression: Leg press progression should be evaluated each session using RPE scale and/or number of repetitions for fatigue within 8-15 repetitions. ● Note: Example of complexity of task using bridging exercise <ul style="list-style-type: none"> ○ Perform typical bridge ○ Progress complexity by using no arms

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		for stabilization to single-leg bridges to using legs on top of exercise ball (dynamic surface).
<ul style="list-style-type: none"> • Sets, frequency, rest, and fatigue • Training schedule based on practice settings and patient/client abilities 	<ul style="list-style-type: none"> • Design appropriate volume and frequency of strength, power, and endurance training programs considering different settings 	<ul style="list-style-type: none"> • After completion of this content, the student should be able to design a muscle endurance training program for a SNF resident • After completion of this content, the student should be able to design an outpatient muscle power training program incorporating the training schedule into a home program • After completion of this content, the student should be able to progress a fitness center strength training program for aging adults using varied strength training devices and equipment and taking musculoskeletal and other age-related changes into consideration.