

A.T. Still University

Doctor of Physical Therapy Program

Musculoskeletal (MS) Curriculum Content and Objectives

Our students participate in several courses dedicated to musculoskeletal conditions, evaluation, and interventions. The Musculoskeletal core curriculum is delivered over 5 courses over 2 years. The courses present common musculoskeletal conditions and basic orthopedic musculoskeletal examination procedures. The emphasis of our educational delivery is to develop the student's clinical reasoning skills as a foundation to develop their clinical expertise. The faculty utilize many instructional resources including different textbooks in our curriculum, and we do not emphasize one philosophical paradigm in orthopedic clinical practice. We do place a strong teaching emphasis on the Clinical Practice Guidelines published by the Academy of Orthopaedic Physical Therapy linked to the ICF throughout the curriculum.

Biomechanics (2 courses):

These two courses consist of lectures along with discussion groups and laboratory sessions to build foundational knowledge for students to be able to describe the biomechanics, function, and structure related to human movement. Students also gain exposure and competence in assessing biomechanics, function, and structure through *palpation, goniometry, and manual muscle testing*. The focus of the first course is upper extremity and cervical spine with the second course focusing on lower extremity, thoracic, and lumbar spine.

Overall course activities prepare the student to apply this foundational knowledge and translate it in other course work and in the clinical environment under clinical instructor guidance. Specific course concepts and experiences are listed below but are not limited to:

- Newton's laws of motion
- Types of forces and force systems
- Classes of lever and relationship to human movement
- Torque and directional components
- Rotational, stabilizing, and destabilizing components
- Stress, strain, creep, bending, torsion, and stress relaxation
- Osteo and arthrokinematics

Students are taking Biomechanics and Therapeutic Exercise courses simultaneously along with two foundational anatomy courses.

Therapeutic Exercise (2 courses):

These two courses consist of lectures along with laboratory sessions for in-depth study and practice of therapeutic exercise techniques and handling skills. The first of the two courses focuses on foundational knowledge and skills where students learn how to prescribe aerobic, resistance, range of motion, stretching, and neuromuscular coordination exercises. The second course builds from this with further prescription of therapeutic exercise aimed at addressing impairments in muscle performance, joint mobility, flexibility, and movement coordination of the extremities and spine for improving activity limitations. Concepts and considerations of tissue healing, of post-surgical rehabilitation and for special populations are covered within these courses.

Overall course objectives are to prepare the student to apply their therapeutic exercise knowledge and skills in future clinical course work and in their clinical education to improve impairments and activity limitations to enhance patient participation. Students must apply their anatomy and biomechanics foundational knowledge to therapeutic exercise. Specific course concepts and experiences are listed below:

- Therapeutic exercises:
 - Passive range of motion, active range of motion
 - Muscle strengthening, endurance, power
 - Manual stretching and self-stretching
 - Neuromuscular coordination and proprioceptive neuromuscular facilitation exercises
 - Isometric, concentric, and eccentric exercises
 - Aerobic exercise, respiration and breathing exercises
- Types of equipment:
 - Manual, elastic, body weight resistance
 - Dumbbells, barbells
 - Physioballs and medicine balls
 - Wands, pulleys, powder boards
 - Balance boards, rocker boards

Pathophysiology and Differential Diagnosis:

During the spring of the first year, students dive into these courses. Basic pathophysiological process in disease and trauma, including but not limited to inflammation, immunity, neoplasms, musculoskeletal conditions, and cardiorespiratory diseases are covered. Stages of tissue healing are covered at a deeper level. Students learn to:

- Categorize clinical signs and symptoms to various pathologies of system disorders
- Describe the use of flags used for screening patients during the systems review
- Determine appropriate signs/symptoms, incidence, characteristics, pathogenesis, etiology and prognosis
- Explain morphological alterations of multiple diseases
- Explain the impact of physical therapy interventions on disease
- Identify the need for physical referral as well as signs/symptoms requiring emergency intervention

Differential Diagnosis begins after the completion of pathophysiology so students can apply knowledge as it relates to a greater understanding of clinical signs and symptoms of various diagnoses. This course expands their knowledge and clinical decision-making skills including clinical reasoning, clinical judgment, and reflective practice. This lecture-based course involves small group activities and case presentations as students focus on the clinical management of common diseases throughout multiple systems, emphasizing diagnosis, prognosis, medical and rehabilitation management. Students revisit concepts of appropriate patient referral and determine when patients are or are not appropriate for physical therapy.

Musculoskeletal I, II, III, IV, V:

The MS courses are designed to build on the foundational knowledge gained and require the students to take concepts forward. The courses begin with the lumbopelvic region (year one) and move towards lower extremity, upper extremity and spine (year two). The musculoskeletal-specific content is threaded throughout the curriculum with the first two courses beginning in spring of their first year.

Musculoskeletal I:

The first of the courses provide foundational knowledge and skills related to examination, evaluation, diagnosis, prognosis, and interventions. Once again, the ICF model is a framework for clinical reasoning and the foundational skill set practice in the laboratory sets the stage to build upon content, knowledge, and application to further the student's learning in courses to come.

Specific tests and measures related to peripheral nerve integrity, joint integrity and mobility, mobility, motor function, pain, posture, range of motion, reflex integrity, and sensory integrity are a strong focus with continued learning of joint mobilization techniques, manipulation techniques, motor function training for the lower extremity as well as tying previous patient education and therapeutic exercise content together.

Musculoskeletal II and III:

MS II builds upon MS I specifically for lumbopelvic conditions. Student apply the foundational knowledge of examination, evaluation, diagnosis, prognosis, interventions, and outcomes using the ICF model. Students in Musculoskeletal III move into conditions of the lower extremity from examination, evaluation, diagnosis, and prognosis to specific interventions and outcomes. The students revisit concepts from previous MS courses and build a framework of performance of tests/measures and interventions related to the lower extremity conditions including but not limited to:

- Gait, locomotion, balance
- Joint integrity and mobility
- Orthopedic special tests for the extremities
- Joint mobilization and manipulation techniques
- Motor function training

Common conditions discussed in MS II include:

- Serious low back pain conditions requiring medical referral (red flags)
- Specific low back pain such as lumbar radiculopathy, lumbar spinal stenosis, spondylolysis, and spondylolisthesis
- Non-specific low back pain with discussions of frameworks:
 - Updated Treatment Based Classification 2016
 - McKenzie Approach,
 - APTA AOPT Clinical Guidelines for LBP
 - Cognitive Functional Therapy
- Sacroiliac joint pain

MS III covers a variety of prevalent lower extremity conditions including but not limited to:

HIP

Osteoarthritis
Femoral acetabular impingement
Labral lesions
Legg-Calve-Perthes disease
Slipped Capital Femoral Epiphysis
Iliotibial band syndrome
Trochanteric bursitis
Avascular necrosis
Iliopsoas bursitis
Quads/Hams/Add strain
Femur fracture
ORIF
Avulsion fracture
Total hip replacement

KNEE

Patellofemoral pain
Patellar subluxation/dislocation
MPFL Reconstruction
Lateral Release
Osteoarthritis
Total / Partial Knee Replacement
ACL Tear / Reconstruction
PCL Tear / Reconstruction
LCL / MCL Sprain
Meniscus Tear / Repair
Articular Cartilage Defects
Patellar Tendinopathy
Iliotibial Band Friction Syndrome
Sinding-Larson-Johansson Syndrome
Osgood Schlatter Disease

FOOT and ANKLE

Plantar Fasciitis
Lateral/Medial Ankle Sprains
High/Recurrent Ankle Sprains
Achilles Tendinopathy
Fractures
Metatarsal Stress Fracture
Posterior Tibialis Tendinopathy
Morton's Neuroma
Tarsal Tunnel Syndrome
Medial Tibial Stress Syndrome
Midfoot Sprain
Retrocalcaneal bursitis
Haglund's Deformity
Anterior Ankle Impingement
Sever Disease
Fibular Nerve Injury

Musculoskeletal IV and V:

Cervical and thoracic spine come next in the curriculum in MS IV. The course continues to use the ICF model and builds the students ability to interpret data, use clinical judgment, and develop a plan of care appropriate for the patient. Mobilization and manipulation techniques are again practiced relative to the cervical and thoracic spine. Specific content covered includes but is not limited to:

- Neck pain (according to the 2017 clinical practice guidelines): Red and yellow flags; Differential diagnosis; Medical screening
- Mobility deficits: Cervical spondylosis (OA); Cervical myelopathy; Fractures, Jefferson:Canadian C-spine rules; Ligamentous tests; Coronary artery disease; Muscle energy technique; Manipulation – indications/contraindications
- Headache: Primary and secondary headaches; Cervicogenic headache; Craniocervical flexion test; TMG component; SNAG AA

- Radiating pain: cervical cluster test; 1st rib assessment: spring test and CRLF; 1st rib manipulation; cervical manipulation (lateral break)
- Movement coordination impairments: deep neck endurance test; craniocervical flexion test
- Thoracic spine exam/evaluation: Differential diagnosis; Regional interdependence
- Thoracic manipulation: Extension bias; Flexion bias; Ribs; 1st rib; CT junction

Additionally, students study about neoplasms, infection, inflammation disorders (Scheurmans), fractures (trauma and osteoporosis), TOS, disc, mechanical pain, and scoliosis in the MS IV course.

The last of the MS courses (MS V) visits the upper extremities and assist the students in gaining the knowledge necessary for examination and intervention techniques to treat upper quarter conditions using solid clinical reasoning and best practice. Some of the conditions and special tests covered include but are not limited to:

- Shoulder
 - *Myotendinous disorders and impingement*
 - *Rotator cuff pathology*
 - *Primary versus secondary versus posterior impingement*
 - *Biceps pathology*
- Elbow/Hand/Wrist
 - *Ulnar/radial ligamentous injury*
 - *Tendinopathies*
 - *Treatment: manipulation, MWM and mobilizations of DRUJ, PRUJ*
 - *Biceps rupture*
 - *DeQuervains*
- *Instability (AMBRI, TUBS)*
- *Labral tears (Bankart, SLAP)*
- *TOS, upper limb tension tests (median, ulnar, and radial)*
- *Frozen shoulder*
- *AC/SC pathology (separation grade/fractures)*
- *Osteoarthritis*
- *Allen's Test*
- *Watson's Test*
- *TFCC injury*
- *Fractures*
- *CMC Grind Test*
- *Tendon zones of the hand*
- *Bunnell-Litler Test*
- *Semis-Weinstein Monofilaments Tests*

Additional Courses:

In the final stages of the didactic curriculum, students participate in several courses including:

- Imaging
- Pain Management
- Musculoskeletal Seminar
- The Complex Patient

These courses are designed to provide additional knowledge for current practice in the complex healthcare environment.

- The Imaging course exposes the students to radiologic and other imaging techniques while including the theory and application of imaging in the rehabilitation setting.
- Pain Management requires much active learning for students to gain a deeper understanding of clinical management of acute and chronic pain with a large emphasis on chronic pain exposing students to pain science.
- Musculoskeletal Seminar is a lab-based course where students are challenged to synthesize the two years of didactic knowledge related to physical therapy management of patients with musculoskeletal conditions. Patient cases presented are often not simplistic and encompass neurological and psychosocial considerations.
- The Complex Patient course presents strategies for managing patients with complex medical and/or psychosocial issues with case study presentations highlighting a framework of care throughout the continuum.

Techniques:

<i>MS I</i>	AROM w/ overpressure	Passive Physiologic Range of Motion	Passive Accessory Motion	Myotomes, Dermatomes, DTR
	<i>Glenohumeral Ulnoradial Radial Carpal Tibiofemoral Talocrural</i>	<i>Glenohumeral Ulnohumeral Ulnoradial Radiocarpal Hip Tibiofemoral Talocrural Subtalar Midfoot and Forefoot</i>	<i>Glenohumeral: Inferior glide Posterior glide Distraction Distal Radial-Ulnar: Dorsal glide Palmar glide Radiocarpal: Distraction Anterior glide Posterior glide Hip: Distraction Inferior glide Lateral glide Anterior glide Patella: Superior glide Inferior glide Tibiofemoral Posterior glide Talocrural Posterior glide</i>	<i>Upper quarter Lower quarter</i>

<i>MS II</i>	AROM w/ overpressure	Passive Physiologic Range of Motion	Passive Accessory Motion	Passive Accessory Mobilization / Manipulation
	<i>Thoracic Spine:</i> <i>Flexion</i> <i>Lumbar Spine:</i> <i>Flexion</i> <i>Extension</i> <i>Sidebending</i>	<i>Lumbar Spine:</i> <i>Flexion</i> <i>Extension</i>	<i>Lumbar Spine:</i> <i>Central PA</i> <i>Unilateral PA</i> <i>Lumbar Rotation Mobilization</i>	<i>Lumbar Spine:</i> <i>Rotation mobilization</i> <i>Rotation Manipulation</i> <i>Sacral PA Glide</i> <i>Muscle Energy Techniques</i>