

## A.T. Still University

### Neurologic Curriculum Content and Objectives

Our students participate in several courses dedicated to neurological conditions, evaluation, and interventions over two years of didactic work. The courses encompass the ICF model and clinical reasoning throughout.

#### *Neuroscience and Neural Conditions:*

These courses consist of lectures along with “white board” sessions for in-depth study into the anatomy and physiology of the nervous systems with an emphasis on the etiology, pathophysiology, diagnosis, and medical management of neurological diseases and conditions.

Specific course objectives relating to neuroanatomy and neurophysiology focus on the basic organization of the CNS including structures of the human brain, brainstem and spinal cord. Students discuss the different cells of the CNS, the neuronal electrophysiology and synaptic transmission. Other topics covered in these two courses consist of:

1. Neural plasticity, neural injury, and repair
2. Nervous system development
3. Autonomic nervous system
4. Anatomy and physiology of the motor system to include:
  - Basal Ganglia
  - Cerebellum
  - Supraspinal control centers
  - Spinal control centers
  - Descending pathways
  - The motor unit
5. Anatomy and physiology of the somatosensory system:
  - Peripheral receptors
  - Reflexes
  - Ascending pathways
  - Cortical processing
  - Pain
6. Anatomy and physiology of the cerebrum.
7. Blood supply of the central nervous system and the consequences of disruption.
8. Pathophysiology and sequelae of brain injury.
9. Anatomy and physiology of the special senses, including hearing and vision.
10. Anatomy and physiology of the cranial nerves and other brainstem structures.
11. Etiology, pathophysiology, symptoms, possible complications and medical / surgical management and clinical management of the following neurological conditions. Students learn to differentiate between these neurological conditions as well.
  - Amyotrophic Lateral Sclerosis
  - Autism

- Cerebellar Disorders
- Genetic Disorders Affecting the CNS
- Guillain Barré
- Multiple Sclerosis
- Myasthenia Gravis
- Parkinson's Disease and other movement disorders
- Alzheimer's and other dementias
- Cerebral Palsy
- Neoplasms & Infections of the Central Nervous System
- Psychiatric disorders
- Stroke
- Seizure disorders
- Traumatic Brain injury
- Vestibular disorders and dizziness

Students further their understanding in Topics of Rehabilitation and Neurorehabilitation I and II. These classes take place in lecture, small group discussions/activities, and laboratory learning. Students also participate in activities with various community members presenting with amputation, stroke, Parkinson's disease, and other neurological conditions.

### ***Topics in Rehabilitation:***

This course covers several aspects including the use of the International Classification of Functioning, Disability and Health; use of laboratory values in rehabilitation; tests and measures as well as interventions for the rehabilitation of persons with conditions such as arthritis, amputation, trauma, hip arthroplasty, or cancer; and application and practice of advanced skills in proprioceptive neuromuscular facilitation.

1. A variety of outcome measures are covered for impairments, activity limitations, and participation restrictions including but not limited to those that assess:
  - Assistive and adaptive devices
  - Circulation
  - Endurance
  - Environmental, home and work barriers
  - Functional skills of bed mobility, transfers, and ambulation
  - Gait, locomotion, and balance
  - Integumentary integrity
  - Muscle performance
  - Orthotic, protective, and supportive devices
  - Integumentary integrity
  - Posture
  - Prosthetic requirements
  - Sensory integrity
  - Self care and home management

2. Case scenarios are used frequently for students to:
  - Interpret evaluation findings based on the ICF disablement model.
  - Identify personal and environmental factors that may affect outcome.
  - Discuss diagnosis, etiology, pathophysiology, and prognosis.
  - Design a physical therapy plan of care that is safe, effective, patient/client-centered and based on patient goals and outcomes.
3. Physical therapy interventions specific for those with neurological conditions including but not limited to:
  - Functional training in self-care, home, community, leisure integration or reintegration, including ADL (activities of daily living), including, but not limited to: bed mobility, transfers, W/C mobility, gait training
  - Prescription, fabrication, and application of assistive, adaptive, supportive and protective devices and equipment
  - Therapeutic exercise, including, but not limited to strengthening exercises, range-of-motion/stretching exercises/techniques, treatment strategies/techniques to improve movement function, pre-gait activities, balance exercise, and proprioceptive neuromuscular facilitation.

## ***Rehabilitation Course Series***

Students also complete a series of neurorehabilitation courses which include lecture, small group activities, laboratory activities, and interactions with individuals with brain injury.

The early part of these courses consists of the study of neuroplasticity and theories of motor control and motor learning, including underlying assumptions, relationships to recovery of function, and clinical application for persons with neurological disorders. The course also includes assessment of individuals with brain injury or disease.

Focus then shifts to application and practice of interventions for individuals with brain injury or disease. The course also includes assessment and treatment of individuals with conditions such as spinal cord injury, Parkinson's Disease, Multiple Sclerosis, Guillain-Barré Syndrome, motor neuron diseases, and vestibular disorders.

Evidence-based practice is emphasized throughout the curriculum and students apply current knowledge of the principles of neuroplasticity, motor learning, motor control, the ICF disablement model, and professional judgment to the evaluation and treatment planning processes while considering the patient/client perspective.

1. Tests and measures in these courses build on the Topics in Rehabilitation and include, but are not limited to, those that assess:
  - Aerobic Capacity/Endurance
  - Arousal, Attention, and Cognition
  - Circulation (Arterial, Venous, Lymphatic)

- Cranial and Peripheral Nerve Integrity
  - Joint Integrity and Mobility
  - Motor Function (Motor Control and Motor Learning)
  - Muscle Performance (including Strength, Power, and Endurance)
  - Prosthetic Requirements
  - Range of Motion (including Muscle Length)
  - Reflex Integrity
  - Self-Care and Home Management (including activities of daily living [ADL] and instrumental activities of daily living [IADL])
  - Sensory Integrity
  - Ventilation and Respiration/Gas Exchange
  - Work (Job/School/ Play), Community, and Leisure Integration or Reintegration (including IADL)
2. Students continue the process of evaluating data from the examination to make clinical judgments, develop a plan of care, and engage in the diagnostic process.
  3. Interventions in these classes are based on patient/client impairments, activity limitations, and participation restrictions and include:
    - Therapeutic Exercise
    - Functional Training in Self-Care and Home Management
    - Functional Training in Work (Job/School/Play), Community, and Leisure Integration or Reintegration
    - Prescription, Application, and, as Appropriate, Fabrication of Devices and Equipment
    - Airway Clearance Techniques
    - Integumentary Repair and Protection Techniques
    - Electrotherapeutic Modalities
    - Physical Agents
  4. Students also discuss the use of home modifications and adaptive equipment for optimizing function, based on knowledge of the client's impairments, diagnosis, functional status, home setting, and available resources.
  5. The courses also focus on making recommendations for long-term patient/client progress beyond the current rehabilitation setting, based on outcome assessments, patient/family goals and needs, cultural issues, and the effect of societal factors.