

PHYT 8925 - Applied Neuroscience for Physical Therapists

Fall 2026 Syllabus, Section 01, CRN 41668,

Credit hours: 4

Instructor

Edmund Ickert

Professional Qualifications:

PhD,, Health Sciences, Youngstown State University

DPT, Physical Therapy, Youngstown State University

Master's, Chemistry, Case Western Reserve University

Bachelor's, Chemistry, Youngstown State University

Bachelor's, Biology, Youngstown State University

Co-Coordinator

Email: ecickert@ysu.edu

Office: Cushwa B326

Office Phone: 330-941-1326

Preferred Contact Method: Email

Communication Expectations:

Students who reach out to faculty through email should allow 24 hours

to receive a response during the week (M-F) and 48 hours over the course of the weekend (Sat-Sun).

Shannon Dudash

Professional Qualifications:

PhD, Health Sciences, Youngstown State University

DPT, Doctor of Physical Therapy, Youngstown State University

Bachelor of Science, Youngstown State University

Co-Coordinator

Email: [sstarr@ysu.edu](mailto:ssstarr@ysu.edu)

Office: Cushwa B319

Office Phone: 330-941-2407

Preferred Contact Method: Email

Communication Expectations:

Students who reach out to faculty through email should allow 24 hours

to receive a response during the week (M-F) and 48 hours over the course of the weekend (Sat-Sun).

Course Description

8925. Applied Neuroscience for Physical Therapists. Introduction to the anatomy and physiology of the human central and peripheral nervous systems. Interaction and relationships between the various structures are described in order to understand movement, sensation and higher cortical functions. Structure is related to function through clinical case examples with an emphasis on the importance for physical therapy assessment and intervention. Four hour lab. 4 s.h.

Course Readings

Group	Title	Author	ISBN
Required	Neuroscience: Fundamentals for Rehabilitation (6th Edition)	Laurie Lundy-Ekman	9780323792677



Optional	Neurologic Rehabilitation: Neuroscience and Neuroplasticity in Physical Therapy Practice (2nd Edition)	Deborah S. Nichols Larsen	9781260461398
Optional	Neuroanatomy Through Clinical Cases (2nd Edition)	Hal Blumenfeld	9780878936137
Optional	Neuroanatomy Atlas in Clinical Context: Structures, Sections, Systems, and Syndromes (11th Edition)	Duane E. Haines	9781975197292

The course readings are subject to change in the event of extenuating circumstances, research developments, current events, and/or to ensure better learning.

Schedule of Topics and Assignments

Day	Date	Reading(s)	Proposed Topic	Due/To Prepare for Class
Tue	8/25	Lundy-Ekman Chapters 1, 2	Syllabus and Course Introduction Overview of the nervous system: terminology and surface anatomy (CLO 1)	
Fri	8/28	Lundy-Ekman Chapters 2, 4	Neuroanatomy fundamentals and overview: cells of the nervous system, lobes, subcortical structures, and brainstem (CLO 1, 4, 13)	
Tue	9/1	Lundy-Ekman Chapter 3 Nichols-Larson Chapter 10 (not pediatric section)	Introduction to the neurologic examination framework (CLO 10)	
Fri	9/4	Lundy-Ekman Chapters 5, 6	Physiology & Synaptic Transmission of neurons (CLO 4, 5)	Quiz #1
Tue	9/8	No assigned readings	Neuro Lab #1 - Structure ID: Brain lobes, sulci/gyri, brainstem regions, spinal cord segments; identification on models/ atlas Neuro Testing: Introduction to neurologic screening: orientation, level of consciousness, myotome/dermatomes (CLO 1, 10)	
Fri	9/11	Lundy-Ekman Chapters 7,8	Neuroplasticity and Nervous system development (CLO 3, 11)	
Tue	9/15	Lundy-Ekman Chapter 10	Overview of the peripheral somatosensory system (CLO 6, 9)	Lab Worksheet #1 Due
Fri	9/18	Lundy-Ekman Chapter 11	Overview of the central somatosensory system (CLO 6, 9)	Quiz #2
Tue	9/22	Lundy-Ekman Chapter 12	Pain as a disease and as a symptom (CLO 9)	
Fri	9/25	Lundy-Ekman Chapter 13	Overview of skeletal muscle structure and function (CLO 5, 9)	Quiz #3
Tue	9/29	No assigned readings	Neuro Lab #2 - Structure ID: DCML vs. spinothalamic tract course on spinal cord models; thalamic nuclei; somatosensory cortex homunculus; dermatome maps Neuro Testing: Light touch, sharp/dull discrimination, proprioception/kinesthesia, vibration, two-point discrimination, temperature; sensory charting and localization of deficit patterns (CLO 6, 8, 10)	

Fri	10/2	Lundy-Ekman chapter 14	Upper and Lower Motor Neuron Lesions (CLO 6, 8)	
Tue	10/6	No assigned readings	Examination #1 (CLO 1-6, 9-11)	Lab Worksheet #2 Due
Fri	10/9	Lundy-Ekman Chapter 15	Overview of the Cerebellum (CLO 7, 8)	
Tue	10/13	Lundy-Ekman Chapters 16, 17	Overview of the Basal ganglia (CLO 7, 8, 13)	
Fri	10/16	Lundy-Ekman Chapter 18	Organization and structure of the peripheral nervous system (CLO 1, 6)	Quiz #4
Tue	10/20	No assigned readings	Neuro Lab #3 – Structure ID: Corticospinal tract pathway on models; anterior horn cell anatomy; upper vs. lower motor neuron pathways; pyramidal tract somatotopy, cerebellum, basal ganglia Neuro Testing: Deep tendon reflexes; Babinski/plantar response; muscle tone assessment (Modified Ashworth); clonus; Hoffman sign; UMN vs. LMN clinical differentiation (CLO 6, 8, 10)	
Fri	10/23	Lundy-Ekman Chapter 19	Spinal region anatomy and clinical correlates (CLO 1, 6, 8)	
Tue	10/27	Lundy-Ekman Chapters 20, 21	Overview of brainstem anatomy (CLO 1, 8)	Lab Worksheet #3 Due
Fri	10/30	Lundy-Ekman Chapters 22, 23	Overview of the vestibular and visual systems (CLO 7, 8, 10)	
Tue	11/3	Lundy-Ekman Chapter 9	Overview of the autonomic nervous system (CLO 9)	
Fri	11/6	Lundy-Ekman Chapters 25, 26	Overview of the vascular supply of the brain (CLO 2, 8)	Quiz #5
Tue	11/10	No assigned readings	Neuro Lab #4 – Structure ID: Brainstem levels on models (midbrain/pons/medulla landmarks); cranial nerve exit points; nuclei locations; cerebellar peduncles Neuro Testing: Cranial nerve screening (CN I–XII): olfaction, visual acuity/fields, EOM/pupillary response, facial sensation & symmetry, hearing (Weber/Rinne), palate/gag, SCM/trapezius strength, tongue; localization of brainstem level from CN deficits (CLO 8, 10)	
Fri	11/13	Lundy-Ekman Chapters 27, 28	Overview of the cerebral cortex and it's function (CLO 1, 7, 8, 13)	
Tue	11/17	No assigned readings	Examination #2 (CLO 1, 2, 6, 7, 8, 9, 10)	Lab Worksheet #4 Due
Fri	11/20	Lundy-Ekman Chapters 29, 30	Overview of the limbic system and communication/attention (CLO 9, 13)	Quiz #6
Tue	11/24	No assigned readings	Neuro Lab #5 – Structure ID: Cortical regions on brain models (frontal/parietal/temporal/occipital lobes, limbic structures, association cortices, corpus callosum); vascular supply Neuro Testing: Cognitive/cortical screen: orientation, attention (digit span), language (fluency/naming/repetition), memory (3-object recall), visuospatial (clock draw), praxis, neglect (CLO 8, 10, 13)	
Fri	11/27	No Class		
Tue	12/1	No assigned readings	Final Case Presentations (CLO 6, 7, 8, 11, 12, Final Presentations Due 13)	
Fri	12/4	No assigned readings	Final Case Presentations (CLO 6, 7, 8, 11, 12, Lab Worksheet #5 Due 13)	

Tue	12/8	No assigned readings	Final Examination (CLO 1-13)
Fri	12/11	No Class	

The course schedule, policies, procedures, and assignments in this course are subject to change in the event of extenuating circumstances, by mutual agreement, and/or to ensure better learning.