

PT 610: NEUROSCIENCE FOR CLINICAL PRACTICE II

Course Description: Human neuroanatomy and neurophysiology with emphasis on motor theory and the sensory and motor systems involved in the acquisition and control of movement. Discussion of normal functions as well as the clinical signs and symptoms of pathological lesions affecting the nervous system. Applicable health conditions, impairments, and activity limitations of the nervous system relevant to current practice are introduced.

Department Offering the Course: Physical Therapy

Credit Hours: 3 credit hours

Instructor(s): David Relling PT, PhD, Cindy Flom-Meland, PT, MPT, PhD, NCS, Amanda Wilson, PT, DPT, NCS

Clock Hours: Lecture: 48 lecture/Discussion Hours

Course Prerequisites: Registered in Professional Physical Therapy curriculum

GOALS AND OBJECTIVES – Spring 2024

After the completion of this course, the student will be able to:

1. Describe the clinical decision-making (CDM) process and identify the major responsibilities of the physical therapist.
2. Discuss the models of enablement and be able to apply them to clinical situations.
3. Discuss various theories behind the neuromuscular basis of controlled, coordinated activity
4. Examine adult clients for basic motor control impairments and functional deficits.
 - a. Contrast Traditional Models and Task-oriented Model of Neurological Assessment.
 - b. Identify the purposes and components of the examination of motor function, including but not limited to the following impairments:
 - Muscle weakness
 - Abnormal tone/reflexes
 - Sensory and perceptual dysfunction
 - Incoordination
 - Balance dysfunction.
 - c. Analyze the use of standardized scales for functional assessment.
5. Perform and teach the patient, when applicable, specific therapeutic interventions designed to establish or maintain muscle control/learning, coordination, and/or patient relaxation. To demonstrate this ability, the student should be able to:

- a. Discuss the application of the Kenny technique of muscle re-education of prime movers, including identification of the rationale and requirements of this type of exercise.
 - b. Identify and discuss the primary principles and perform techniques of neuro-facilitation (Traditional) approaches, including methods of:
 - Rood
 - Brunnstrom
 - Bobath: Neuro-Developmental Training (NDT)
 - Kabat, Knott, and Voss: Proprioceptive Neuromuscular Facilitation (PNF)
 - c. Identify and discuss primary principles of the Task-Oriented (Contemporary) Model in treatment interventions.
 - d. Design treatment interventions (based on b and c above) for common impairments observed in neurological patients, such as but not limited to:
 - Weakness
 - Abnormal Tone
 - Sensory/Perceptual Dysfunction
 - Incoordination
 - Balance Dysfunction
 - e. Perform techniques designed as relaxation exercises and be able to discuss the theoretical rationale of this type of activity.
6. Design a comprehensive physical therapy program for orthopedic and neurological clients throughout the continuum of care, integrating current and previous coursework, through the use of case studies/scenarios.
 7. Demonstrate recognition of the importance of collaboration and education with patients, families, those individuals responsible for the patient, and colleagues in the design and implementation of treatment programming.
 8. Demonstrate effective professional writing skills in the development of treatment plans and documentation of physical therapy services that present aspects of history, examination, assessment, planning, and treatment programming utilizing terminology appropriate for the audience intended.
 9. Evaluate published studies related to motor control and learning and to physical therapy practice.
 10. Understand the implications of individual and cultural differences as related to physical therapy practice.
 11. Demonstrate professional behavior and appropriate communication in all interactions with patients/clients, families, and other healthcare workers.
 12. Apply evaluation screening skills (posture, balance, etc.) that have been learned into “real-life” situations (i.e., lab practicals, and community health fairs) under the supervision of instructors.

13. Recognize the importance of health maintenance and promotion and prevention of disease and disability and identify the health needs of individuals through screening, prevention, and/or wellness programs in the community.
14. Describe the major vestibular pathways, and discuss the physical signs and symptoms associated with pathologies of this system.
 - a. Identify and describe the major vestibular pathways.
 - b. Describe the vestibular-ocular reflex.
 - c. Describe the pathophysiology of benign positional vertigo.
15. Discuss the concept of pain modulation and the theories which attempt to explain the modulation of pain.
 - a. Differentiate between the gate control theory and the opiate theory of pain modulation.
 - b. Differentiate between the actions of enkephalins and endorphins.
 - c. Describe the effects of central sensitization.
16. Recognize pharmacokinetic and pharmacodynamic principles of drug classes utilized in the treatment of neurological disorders.
 - a. Identify effects of general drug classifications utilized by patients with neurological disorders.
 - b. Identify side effects of general drug classifications utilized by patients with neurological disorders

GRADING SCALE: A (90 – 100%), B (80 – 89.9%), C (76 – 79.9%). Grades are based on written examinations and course applications/online quizzes. Students must achieve 85% on online quizzes to obtain full points in the gradebook. Scores for late assignments will be deducted 10% for the first week after the due date. No late assignments accepted after 1 week.

Exam I	20%
Exam II	25%
Exam III	20%
Exam IV Final	25%
Quizzes and Course Applications	10%

Academic Integrity:

In accordance with the rules concerning scholastic dishonesty in the Code of Student Life* at the University of North Dakota, I affirm that I understand these rules and I agree to comply with them.

I will not:

- a. receive any additional information or assistance for any exam other than what was provided during class or approved tutor sessions
- b. copy from another student's test
- c. collaborate with or seek aid from another student who may have previously taken the exam

- d. knowingly use, buy, sell, steal, or solicit in whole or in part the contents of any exam
- e. bribe another person to obtain information about any exam

Department of Physical Therapy Honor Code Pledge:

“Upon my honor as a professional student in the physical therapy program at the University of North Dakota, I pledge that I will not give nor receive unauthorized aid on written examinations, laboratory practical examinations, written assignments, take home assignments or clinical assignments”

Examination disclaimer: “I affirm that I have adhered to the Honor Code in this assignment”

A. Forms of Academic Dishonesty. Academic dishonesty includes, but is not limited to:

1. Copying or distributing examination items
2. During testing, using crib notes or various forms of technology not authorized by faculty
3. Copying another student’s written paper or examination, with or without their knowledge
4. Helping someone else cheat on a test
5. Communicating or collaborating during a test by electronic means such as instant messaging, telephone, texting, smart watches, or social media.
6. Discussing test items or answers (written or laboratory) with students who have not yet taken the examination
7. Cutting and pasting text from any source without giving proper citation to that source
8. Plagiarism of any materials
9. Fabricating or falsifying written materials
10. Falsely reporting information or actions in clinical or classroom laboratories
11. Submitting the same paper, or a substantially similar paper, for the requirements of more than one course without the approval of the instructor(s) concerned
12. Submitting term papers or assignments written by another person
13. Consenting to having one’s work used by another student as his or her own
14. Collaborating on a project (in person or via electronic means) when the instructor asked for individual work
15. Using a false excuse to obtain an extension on a due date or delay an examination
16. Depriving other students of necessary course materials by stealing books, periodicals, or other materials from libraries, AV centers, etc.

If problems occur, students are required to work through channels of communication to resolve the problem before going to the chair or dean. The channel is student, instructor, chair, associate dean health sciences, and dean. rev 12/2023

Notice of Nondiscrimination

It is the policy of the University of North Dakota that no person shall be discriminated against because of race, religion, age, color, gender, disability, national origin, creed, sexual orientation, gender identity, genetic information, marital status, veteran’s status, or political belief or affiliation and the equal opportunity and access to facilities shall be available to all. Concerns regarding Title IX, Title VI, Title VII, ADA, and Section 504 may be addressed to Donna Smith, Assistant Vice President for Equal Opportunity and Title IX/ADA Coordinator, 102 Twamley Hall, 701.777.4171, UND.EO.TitleIX@UND.edu or the Office for Civil Rights, U.S. Dept. of Education, 230 S. Dearborn St., 37th Floor, 500 West Madison, Suite 1475, Chicago, IL 60611 or any other federal agency.

Accessibility Statement

The University of North Dakota is committed to providing equal access to students with documented disabilities. To ensure access to this class and your program, please contact [Accessibility for Students](#) to engage in a confidential discussion about accommodations for the classroom and clinical settings. Accommodations are not provided retroactively. Students are encouraged to register with Accessibility for

Students at the start of their program.

More information can be obtained by email, UND.accessibilityforstudents@UND.edu, or by phone at 701.777.2664.

Religious Accommodations

UND offers religious accommodations, which are reasonable changes in the academic environment that enable a student to practice or observe a sincerely held religious belief without undue hardship on the University. Examples include time for prayer or the ability to attend religious events or observe a religious holiday. To request an accommodation, complete [student religious accommodation request form](#) . If you have any questions, you may contact the [Equal Opportunity & Title IX Office](#).

Pregnancy Accommodations

Students who need assistance with academic adjustments related to pregnancy or childbirth may contact the [Equal Opportunity & Title IX Office](#) or Academic Affairs to learn about your options. Additional information and services may be found at [Pregnancy Resources](#).

Reporting Discrimination, Harassment, or Sexual Misconduct

If you or a friend has experienced sexual misconduct, such as sexual harassment, domestic violence, dating violence, or stalking, please contact the [Equal Opportunity & Title IX Office](#) or UND's Title IX Coordinator, Donna Smith, for assistance at 701.777.4171 or donna.smith@UND.edu.

You may also contact the Equal Opportunity & Title IX office if you or a friend has experienced discrimination or harassment based on a protected class, such as race, color, national origin, religion, sex, age, disability, sexual orientation, gender identity, genetic information, pregnancy, marital or parental status, veteran's status, or political belief or affiliation.

Faculty Reporting Obligations Regarding Discrimination, Harassment, or Sexual Misconduct

It is important for students to understand that faculty are required to share with UND's Title IX Coordinator any incidents of sexual misconduct or of discrimination or harassment based on a protected class that they become aware of, even if those incidents occurred in the past or are disclosed as part of a class assignment. This does not mean an investigation will occur if the student does not want that, but it does allow UND to provide resources to help the student continue to be successful at UND. If you have been impacted by discrimination, harassment, or sexual misconduct, you can find information about confidential support services at the [Equal Opportunity and Title IX](#) webpage.

Health and Safety

UND is committed to maintaining a safe learning environment while providing quality learning experiences for our students. As such, UND asks students and instructors to be flexible when necessary to promote a safe environment for learning. Please do not attend an in-person class or lab if you are feeling ill or if you have been directed by health professionals to quarantine or isolate. UND follows isolation and quarantine guidelines recommended by the [CDC and the North Dakota Department of Health](#). If you are not able to attend class or lab, please notify your instructor as soon as possible and discuss options for making up any missed work in order to ensure your ability to succeed in the course. If you will have an extended absence due to serious illness or other uncontrollable circumstances, you may request an absence notification through the [Office of Community Standards](#). Similarly, if your instructor is ill they may need to cancel class or temporarily move your course to online delivery to ensure that you are able to complete the course successfully. Please consult the [COVID-19 at UND](#) webpage for information regarding on-campus COVID-19 testing, isolation and quarantine guidelines, and vaccines.

**PT 610: Neuroscience for Clinical Practice II
Spring Semester, 2024**

Faculty: David Relling PT, PhD; Cindy Flom-Meland, PT, MPT, PhD, NCS;
Amanda Wilson, PT, DPT, NCS
11:00-11:50 am Monday & Wednesday

DATE	TOPIC	
JANUARY		
8	UND Start of Classes---4pm	
10	No Class – reserved for PT 606	
12	No Class – reserved for PT 606	
15	No Class – Martin Luther King Jr. Day	
17	Clinical Decision-Making	Cindy
22	Clinical Decision-Making	Cindy
24	Clinical Decision-Making	Cindy
29	Perceptual Dysfunction	Cindy
31	Perceptual Dysfunction	Cindy
FEBRUARY		
5	Cognitive Dysfunction	Amanda
7	Cognitive Dysfunction	Amanda
12	Cognitive Dysfunction	Amanda
14	Exam—CDM, Cognitive Dysfunction (CSM)	
19	No Class – President’s Holiday	
21	Weakness/Abnormal Tone	Cindy
26	Weakness/Abnormal Tone	Cindy
28	Weakness/Abnormal Tone	Cindy
MARCH		
4	Spring Break	
6	Spring Break	
8	Spring Break	
11	Incoordination	Amanda
13	Incoordination	Amanda
18	Mid-term Exam Week	
20	Mid-term Exam Week	
22	Mid-term Exam Week	
25	Vestibular System Physiology	Dave
27	Vestibular System Physiology	Dave
29	No Class - Good Friday	
APRIL		
1	No Class - Easter Break	
3	Vestibular System Physiology	Dave
8	Pain Pathways / Modulation	Dave
10	Exam: incoordination & vestibular	
15	Pain (Pain Neuroscience Concepts)	Dave
17	(11am) PT 608 Oncology	

	17	(1-5pm) Pain Neuroscience Concepts; Casey Hansen, PT, DPT	
	22	(11am) PT 608 Oncology	
	24	Neurological Pharmacology	Dave
MAY	29	Neurological Pharmacology	Dave
	1	3-5pm Final Exam	
	3	Reading & Review Day	
	6-10	Finals Week	