

PHT 6190C Motor Control II Summer 2014
Motor Control and Motor Learning for the Neurological Client

Course Description: The purpose of this 3 credit course is to provide the student with a foundation for examining, evaluating, and providing treatment interventions for individuals who have movement dysfunction, primarily secondary to neurological deficits but also inclusive of patients with multi-system disorders. Emphasis is placed on understanding normal and impaired movement through discussion of motor control, motor learning, and neuroplasticity. The ICF model of enablement and the task oriented conceptual framework for intervention will be used as frameworks for evaluating movement dysfunction and for developing intervention plans.

This course teaches examination and evaluation of and interventions for basic functional movement skills and their underlying components such as motor control/coordination (ability to plan, initiate, sequence, time, and grade movement), postural control and balance, perception and sensation, muscle tone and strength, and biomechanical considerations. Students will also understand the role that cognition, emotion, and sensory/perceptual deficits play in rehabilitation process and modifications to intervention to address these areas. Specific neurological and multi-system diagnoses are introduced as examples of common deficits and as cases for evaluation, intervention, and progression during case study class.

Labs develop students' skills in movement analysis and evaluation of and treatment of movement dysfunction. A problem-solving approach is used to develop the students' ability to evaluate the patient with neurological and multi-system involvement, to identify and prioritize key problem areas (systems model), to design and implement an appropriate treatment program based on best current evidence and expert consensus, and to employ handling techniques with the stages of learning to assist the patient to maximum recovery.

Course prerequisites: Course participation is limited to entry-level DPT students in their second year of the UF program who have successfully completed their first year of coursework and their first full-time internship.

Course offered by: Department of Physical Therapy, College of Health Professions, University of Florida

Primary Course Instructor: Gloria Miller, PhD, PT
 Box 100154, HSC, University of Florida
 Office phone: 352-273-6108 Email: gtmiller@phhp.ufl.edu

Teaching Assistants: Fredy Solis, PT (Doctoral student) freddy@phhp.ufl.edu
 TA – TBA

Office Hours:

Immediately after class, during breaks, by appointment (please use e-mail and proper UFL email address to request appointment).

Clock Hours: 6 hours (1.5 hour lecture/discussion/ 1two hour lab; clinical visits, debriefing, clinical cases on line; projects/assignments)

Meeting Schedule

Lecture: Monday 3:30-5:30 pm (maximum) G312) OR 4:30-6:00 pm Shands Rehab Lab: Tuesday 9:30-12 or 12:45-3:15

Clinic visits: Wednesdays all day, or Wed/Fri pm. Two (2) visits per student. Clinic attire. Labs are a combination of new information, discussion, manual activities, and practice.

Teaching Methods: Lecture; lab; demonstrations; patient demonstrations, evaluations of motor control problems, and problem solving for interventions; case studies with videos for problem solving; on-site visits to rehabilitation facility; individual work with assigned patients; practice of psychomotor skills with feedback from instructor and teaching assistants.

Textbooks Required

Shumway-Cook: Motor Control (3rd or 4th Edition) 4th Edition contains compiled research inclusive to 2009
 Neurological Rehab; Umphred; 5th Edition
 Handouts/articles
 Web CT

Announcements:

Specific *announcements and grades* pertinent to PHT 6190C will be found on the Web page under "Announcements". Most updates will occur by email notification – be sure to check your email daily (up to 6 pm). Instructor will announce when Sakai is available for announcements, grades, and clinic visit assignments.

Class preparation/Instructor expectations:

- All reading assignments will be completed prior to lecture/lab, since reference to this information will be made during class time, and will not always be repeated in detail.
- Students come to lab and clinic properly attired and prepared with all materials/equipment.
- Assignments and projects completed thoroughly and timely.
- Excellent interaction with instructors, teaching assistants, and clinical faculty.

Assignments and grading (see current grading scale in student handbook on line)

1. Homework assignments 40%.
2. Exams 2 x 10% each= 20%
3. Competencies 2 x 10% each = 20%. (both manual and verbal reasoning/decision making)
4. Clinic visits and write ups 20%
 - a. Includes interdisciplinary analysis.
 - b. Write up to include observational analysis of movement dysfunction, analysis of intervention(s), evidence assignment, and others as assigned.
5. Development of comprehensive neurological examination P/F. Pass is level 3 or 4 of Bismarck Critical Thinking Test.

Quizzes and cases will be returned in one week. After exams/cases have been returned, grades will not be changed once a week has elapsed. Students wishing to discuss exam questions should schedule *individual* appointments. Students are responsible for checking with the instructor to ensure that the grade is recorded properly if the grade has been changed.

Grading Scale:

93-100 = A	4.00 grade point
90-92 = A-	3.67 grade point
87-89 = B+	3.33 grade point
83-86 = B	3.00 grade point
80-82 = B-	2.67 grade point
79-70 = C	2.00 grade point
69-60 = D	1.00 grade point
Below 60 = E	0 grade point

Dress Code: Professional T shirts and shorts are appropriate attire for lab and lecture. Clinic attire for clinic visits.

Professional Behavior: Effective professional behavior is critical for a successful transition from the classroom to the clinical setting. The faculty recognizes the importance of these behaviors and has incorporated the development as well as evaluation of these behaviors into each academic course. See student handbook.

Academic Honesty:

In this professional program we are particularly sensitive to students submitting independent work and to using complete and accurate referencing in complying with the University of Florida Rules - 6Cl-4.017 Student Affairs: Academic Honesty Guidelines. Further details regarding the University of Florida honesty policy is available at: www.aa.ufl.edu/aa/Rules/4017.htm

All students are required to abide by the Academic Honesty Guidelines, the following pledge has been accepted by the University and is expected of all students:

“I understand that the University of Florida expects its students to be honest in all of their academic work. I agree to adhere to this commitment to academic honesty and understand that my failure to comply with this commitment may result in disciplinary action, up to and including expulsion from the University.”

We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity. On all work submitted for credit by UF students, the following pledge is either required or implied:

"On my honor, I have neither given nor received unauthorized aid in doing this assignment."

General course objectives:

At the conclusion of PHT 6190C, the student will be able to:

1. Describe and apply (deduction) various theoretical and conceptual frameworks to patient/client management. (Guide, ICF Enablement, Hedman-Rogers-Hanke, Systems)
2. Summarize major theories of motor control, discuss their influence (inductive) on current clinical practice. (neurofacilitation, task oriented), and apply to patients/case studies. Describe the contribution of various therapeutic approaches past and present to current practice and intervention.
3. Describe motor learning theories, underlying concepts, and their application to physical therapy practice.
4. Identify variables that affect neuroplasticity and how to create environments to optimize learning including active patient problem solving. Utilize motor learning concepts from MCI.
5. Analyze each component of a systems motor control model, including cognitive, affective, and motor subsections and describe how they relate to movement function and dysfunction.
6. Using multiple observations from video case studies, observed clinical patients, and prior clinical experiences, make inferences from individual patient situations to more general situations.
7. Using facts, rules, and accepted principles from experts and evidence, apply these to specific patients and situations.
8. Given a patient neurological and medical diagnosis, predict (infer) the expected impairments/movements dysfunctions that may be detected in the examination/evaluation.
9. Utilizing a systems approach/task oriented model and an enablement model (ICF, Gordon), outline, organize, and perform an examination and evaluation of a patient with a neurological condition and determine (analysis) the underlying systems responsible for the dysfunction.
10. Develop a comprehensive evaluation that can be used to examine and evaluate all systems of a patient with a neurological disorder. Adapt this examination for the various settings to include acute, sub-acute, inpatient rehabilitation, outpatient and determine when data is best collected by other disciplines. Use a multidisciplinary approach to examination, evaluation, and intervention whenever possible as supported by best evidence.
11. With given resources and student exploration, select (analyze) standardized functional assessment tools and be able to discuss value (evaluate) of use of standardized assessment, present rationale for use of a particular test including validity and reliability, choose the appropriate test for the patient's movement dysfunction to reflect outcomes important to that individual at all levels of ICF model.
12. Utilizing functional activities and participation activities, identify the presence or absence of essential components of specific tasks, hypothesize the underlying impairment, and select an appropriate intervention.
13. Select, describe, and implement basic treatment principles which are important to consider when managing the patient with neurological deficits and which promote optimal learning (practice, errors, feedback, fatigue). Modify interventions to address all systems deficits (e.g. cognitive, perceptual, affective, multi-system involvement, prognosis, social)
14. Identify goal of therapy, type of intervention, and neurophysiological rationale underlying each intervention.
15. Develop and perform accurate and competent handling/facilitation skills that are appropriate to the skill being learned and the cognitive phase of learning of the patient. Determine when facilitation/handling is appropriate during a dynamical systems approach. Adapt skills to patient condition.
16. Observe a specific patient with neurological condition and hypothesize rationale for intervention (deduction) by assigned clinician from PT, OT, SP, neuropsych and seek supporting evidence.
17. Discuss with clinicians current theories of motor control and underlying evidence for intervention.
18. Differentiate functional training, contrived interventions, and somatosensory retraining and their appropriate selection as intervention strategies.
19. Select, demonstrate, discuss, and teach therapeutic exercises and functional activities that could be applied to a patient according to the examination findings, goals of treatment, predicted outcomes, and best evidence.
20. Demonstrate effective teaching and adaptation of teaching considering patient's multiple impairments that may include cognitive, receptive, expressive, sensory/perceptual, and behavioral impairments.
21. Utilizing a systems model, demonstrate the ability to modify/progress (evaluation) a treatment program by adjusting level of complexity and based on patient response. Use concept of reducing degrees of freedom, closed to open environment, closing "window".

22. Share important learning experiences from clinic and current evidence applicable to rehab with peers.
23. Justify and share with clinical faculty current evidence that supports selected and appropriate interventions for observed patients.
24. Share evidence to support or lack of evidence to support current or proposed interventions.
25. Evaluate interventions that lack clinical evidence based on clinical outcomes and underlying neurophysiology and neuroplasticity.
26. Through analysis of published studies, analyze, compare and contrast treatment approaches for the management of the patient with neurological involvement considering methods of outcome assessment and clinical effectiveness, identify and defend optimal intervention strategies based on the evidence in the literature specific for each diagnostic group. (cases, visits, articles).
27. Demonstrate professional curiosity, initiative, and responsibility for one's own learning as reflected by appropriate use of class and lab times, readings, and office hours.
28. Demonstrate professional behavior during clinical visits and in class presentations as reflected by appropriate dress, timeliness, active listening, and appropriate questions.
29. Utilizes and explores the experience and expertise of instructors, teaching assistants, and clinicians to develop neurological skills!

PHT 6190C Motor Control and Motor Learning for the Neurological Patient—Summer 2014

	Monday – lecture This can be 1. Lecture PHHP 3:30-5:30 (all) 2. Lecture Shands Rehab 4:30-6:00 3. Discussion groups (alternating times) 1109 4. Exam time /competency time	Tuesday – lab/group work	Readings Resources Assignments
Week 1 May 12 May 13	Overview, Syllabus Survey – student needs/confidence levels MCI simple problems – few systems MCII – complex, primary/secondary constraints <u>Examination/Evaluation of the patient with a Motor control deficit</u> Conceptual Models: Gordon, Hedman, Systems Model, Task Oriented Compensation to recovery Prognosis and intervention Motor Control Theories – covered in MCI Roles of theories reflex, hierarchical, dynamical systems, CPG PNF, Rood, NDT contributions to current theory Assignment 1 posted May 14 due May 24 Movement analysis sit, stand, walk	Examination/Evaluation Expanded Examination/Evaluation of multi-systems Standardized measures <u>Task(s) analysis – strategies</u> <u>Key movement dysfunction</u> Hypothesize constraints Outcome measures to quantify impairments, functional deficits, participation deficits (QOL) Select best intervention for individual pt. Justify clinical decision making Emphasize all systems, minimize compensation, Early return to recovery Assignment 1 – explanation 1 st clinic visits occur - assignments	Umphred Ch. 8 Appendix 8-A, B Examination Tools for the Neurological client Motor Control Ch. 5, 6 Schenkman M., Deutsch JE, Gill-Body KM. An integrated framework for decision making in neurologic physical therapy practice. Phys Ther. 2006;86:1681-1702 Facione, NC & Facione, PA (1996) Externalizing the critical thinking in clinical judgment. Nursing Outlook, 44, 129-136. Bismarck Critical Thinking Rubric
Week 2 May 19 May 20	Haley Russell, Speech Language Pathologist Location: Shands Rehab 4:30-6:00 <u>Communication and Cognition & Behavior Modification , Memory, Emotions, Motivation</u> Assignment 1 due Friday May 23midnight	<u>NOTE: Service Learning 12-12:45</u> Adapting motor learning and intervention with deficits in cognition, communication, and affect <u>Revisit: Motor learning/motor control</u> PNF revisited – neuromuscular reeducation What /where is facilitation?	Selected reading per speech Additional postings/resources Motor Control Ch. 1, 2 PNF materials Umphred Chapter 9 Table 9-2 –Integrating principles of neuroplasticity into PT intervention
Week 3 May 26 Holiday May 27	Holiday Monday! Assignment 2 posted May 27 due June 6 Pusher patient/apraxia/global aphasia	Postural control, normal and abnormal Static and dynamic Trunk for alignment as a base for extremities The scapula alignment for GHJ	Motor Control Ch. 7, 10, 11 Selections from Umphred Ch. 17/27 Material relevant to postural control Horak BestTest Shumway-Cook Exercises 1997
Week 4 June 2 June 3	Guest lecturer: Becky Piazza, OTR/L Location: Shands Rehab 4:30-6:00 <u>Sensory Perceptual Systems</u> <u>Apraxia, The Pusher, Visual perceptual</u> Assignment 2 due June 6 midnight	Adapting motor learning and intervention with sensory-perceptual deficits	Revisit Ch. 5: Motor control Umphred Ch. 28: vision/visual perception Paci and Nannetti, 2004 Danells et al Stroke 2004 Karnath & Broetz. (2003) Understanding and treating Pusher syndrome. Physical Therapy 83: 1119-1125.
Week 5 June 9 June 10	Locomotor Retraining Assignment 3 posted June 10 due June 20	Locomotor Retraining Treadmill and overground	Locomotor handbook (handout) Revisit locomotor retraining information for SCI and stroke from NRI/MCI Motor Control Text: Ch 12 (normal gait)
Week 6 June 16 June 17	Exam I (one hour max) No lecture: review material prior to lab <u>Regaining movement of the UE</u> Brunnstrom stages of recovery Normal and abnormal synergies Abnormal biomechanical alignment Shoulder alignment , Tone Assignment 3 due June 20 midnight	<u>NOTE: Service Learning 12:00-12:45</u> Use of the Fugl Meyer to drive treatment Regaining normal synergies step by step Strength testing, strengthening Concentrics/Eccentrics Facilitation of the low tone UE and LE Closed chain versus open chain Body on arm activities UE: FES, Kinesiotape	Motor Control Ch. 5 – focus on abnormal synergies, tone, and coordination. Fugl Meyer, Wolf Motor Umphred Ch. 9 Strength training evidence NRI Oullette et al., Stroke 2004 High intensity Resistance Training

Week 7 June 23 June 24	<u>Coordination, Dyscoordination, Ataxia</u> Mini discussion group/lab 1109 A→ B 3:30-4:15 4:20-5:05 Use groups from clinic visit assignments Assignment 4 posted June 24 due July 5 Ataxia/Coordination/Gait	Competency 1 Any activities from cases, clinic visits, labs	Evidence on ataxia from NRII Readings as posted Evidence
Week 8 June 30 July 1	<u>Orthopedic interventions for the neurological client</u> Mini discussion group/lab 1109 B→ A 3:30-4:15 4:20-5:05 Assignment 4 due July 5 midnight	Orthopedic intervention in neurological populations Continue with FES, Kinesiotape Orthopedic Principles Joint accessory motion assessment	Readings/review TBA
Week 9 July 7 July 8	<u>Gait and standing activities</u> Mini discussion group/lab 1109 A→B 3:30-4:15 4:20-5:05	Gait and standing activities Balance activities , ankle strategies Complex skills in upright Early gait activities, posture control, balance reactions--strengthening for gait	Motor Control Ch. 12, 14, 15 Paper – Postural control as an essential element of gait (pending approval)
Week 10 July 14 July 15	<u>The UE continued – progression</u> Mini discussion group/lab 1109 B→ A 3:30-4:15 4:20-5:05 Assignment 5 posted July 15 due July 25 Subarachnoid Aneurysm/Hi level	Reach grasp manipulation Trunk constraint	MC Ch. 16, 18, 19 CIMT literature from NRI stroke
Week 11 July 22 July 23	<u>Advanced activity, balance, gait</u> <u>Return to participation</u> <u>When does recovery end?</u> Full group Assignment 5 posted due July 25 midnight	<u>NOTE: Service Learning 12-12:45</u> Gait activities Advanced aerobic needs Return to participation	Readings TBA NRI – Dr. Rose – Cardio for Neuro Circuit training
Week 12 July 28 July 29	Exam II (one hour max) Competencies (M, T, W) 3:30-5:30 GM, JN, FS	Competencies Any items from clinic visits, cases, labs	

Shands Rehab Clinical Visits

NOTE: Keep in mind that all clinical assignments will be shared with assigned clinicians as well. (see course objectives)

Full day visit 7:30-8:00 → 2:00-3:00 OR half-day visit 1:00-5:00

Directions: in event of illness (Dr. Miller cell 219-6912)

1. University/Newberry west towards mall, R on 43rd, L on 39th. Follow 39th past turn off to Santa Fe. (You are going almost all the way to I-75). Turn R at Shands Rehab. (Sign actually says “Health Park”)
2. Alternate route: I-75 north to turn off for 39th Avenue. Turn R 39th.
3. Park anywhere in the lot.
4. Meet me in the lobby. (for lectures proceed to the left toward the large PT/OT gym)

Dress: Clinic attire. Polo and khakis. Low heeled shoes, close toed.

Bring

- Clipboard, paper, pencil, Modified Ashworth Scale
- Gator ID (you **MUST** have your ID to be on the patient floor or in the gym)
- You may bring lunch in a refrigerated container; there is a cafeteria to purchase lunch.

DON'T bring

- Large backpack (no place to store). You can leave stuff in car. Easy to retrieve at break/lunch.

Assignment criteria for Shands Rehab—Interdisciplinary -- long day visit

Objectives: For each group of two (2) students. 15% of grade (Due Monday after visit 8:30 am.)

This is a **group assignment**—there should be ONE (1) submission for the pair of students. Students are expected to work together to complete assignments, answers should include “we” rather than “I”.

You will be emailed your patient diagnosis and location of lesion if possible. Be prepared to hypothesize possible patient deficits (all systems) on arrival at SR. (can be list, discussion)

1. (1) OT/SP Professions: (.5) Come prepared with a single sheet that describes the profession of Occupational Therapy, their academic preparation and skills they examine/intervene with this population. (.5) Come prepared with a single sheet that describes the profession of Speech Pathology, their academic preparation and skills they examine/intervene with this population. You will add to these after your day visit.
2. (3) Perform comprehensive chart review. Describe patient history and current medical condition. ID three (3) functional problems that the patient is working on in PT and two (2) functional problems that the patient is working on in OT (look at the two week goals). Hypothesize the impairments for each of these five functions. Be comprehensive. Use all systems. Present in summarized form.
3. (4) Observe interventions being provided for each of the functional problems in question 2. List. Determine if they are supported by current evidence and clinical practice guidelines. Name two interventions that you would provide this patient that are not being currently delivered and provide rationale.
4. (2) Evidence shows that there can be substantial benefit from organized inpatient multidisciplinary rehabilitation in the postacute period, which is both statistically significant and clinically important. (Langhorne & Duncan, 2001, Stroke) Name the top five (5) pieces of information that must be communicated between the multiple disciplines about THIS patient that are important for recovery. (e.g. patient’s method of effective communication). Include Strategy that must be used (as intervention) with this patient for effective recovery. Explain your rationale for choices.
5. (5) Answer 1 clinical question posed by the primary therapist or course instructor. Use format for clinical questions in NRI.

Shands Magnolia Parke or Half Day SR visit

You will be emailed the start time the day before by Craig A. Fox, PT, DPT, CSCS
CAFOX@shands.ufl.edu.

Shands Rehab times 1:00-5:00. Follow a single therapist.

Directions: in event of illness (Shands at Magnolia Parke or 265-5200)

1. University/Newberry west towards mall, R on 43rd, L on 39th. Shands Magnolia Parke on the R hand side where stores located.
2. Check in with the front desk.

Dress: Clinic attire. Polo and khakis. Low heeled shoes, close toed.

Bring

- Clipboard, paper, pencil , Modified Ashworth Scale
- Gator ID (you **MUST** have your ID to be on the patient floor or in the gym)
- You may bring lunch in a refrigerated container.

DON'T bring

- Large backpack (no place to store). You can leave stuff in car. Easy to retrieve at break/lunch.

Assignment for Shands Magnolia Parke OR Wed/Fri afternoon visits Shands Rehab

Objectives: **Individual work** . 5% of grade (Due Monday after visit 8:30 am.)

This is an individual assignment . Even if you treat the same patient, and get the same clinical question, this is individual work.

1. (1) You will be seeing more than one patient. Each student will perform this assignment for a different patient. Perform comprehensive chart review of one patient each. Describe patient history and current medical condition. ID three (3) functional problems that the patient is working on in PT. Hypothesize the primary and secondary impairments that are limiting of these three functions. Be comprehensive. Use all systems. Present in summarized form.
2. (2) Observe interventions being provided for each of the functional problems in question 1. List. Determine if they are supported by current evidence and clinical practice guidelines.
3. (2) Answer 1 clinical question posed by the primary therapist or course instructor. Use format for clinical questions in NRI.