

## SYLLABUS

- NAME OF COURSE: **Neurologic Examination LAB (DIAG-737)**  
*(concurrent enrollment in NE lecture – DIAG-237)*
- LENGTH OF COURSE: **10 hours (1 hour lab/week)**
- COURSE DESCRIPTION: This course covers the examination procedures used to evaluate nervous system function, differentiation of normal and abnormal exam results, and localization of the lesion. (This course includes discussion of the physiology of nervous system function, and nervous system pathology.)
- PREREQUISITES: This course will involve the clinical application of neuroanatomy and neuro-physiopathology. It is essential that you have a basic working knowledge of:
1. peripheral nerve motor and sensory functions
  2. basic structure of the CNS
  3. basic nervous system functions (sensory, motor).
- |                                  |          |
|----------------------------------|----------|
| Peripheral Neuroanatomy          | ANAT-114 |
| Central Nervous System           | ANAT-137 |
| Spinal Anatomy                   | ANAT-118 |
| Neuromuscular Physiopathology I  | PHPA-131 |
| Neuromuscular Physiopathology II | PHPA-212 |
- Concurrent enrollment: Neuro Exam lecture (DIAG-237)**
- COURSE OFFERED BY: Clinical Science Dept.,
- REQUIRED TEXTS:
1. Strutin N. Neuro Exam Lecture notes (Canvas)
  2. Strutin N. Neuro Exam Lab Manual (Canvas)
- RECOMMENDED TEXTS:
1. Blumenfeld H. Neuroanat Through Clinical Cases. 2<sup>nd</sup> ed,2010
  2. Bickley LS. Bates' Guide to Physical Examination and History Taking. 11<sup>th</sup> ed. 2012
  3. Cipriano J. Photographic Manual of Regional Orthopedic and Neurological Tests. 5<sup>th</sup> ed. 2010
  4. Fuller G. Neurological Examination Made Easy. 5<sup>rd</sup> ed. 2013

5. Hoppenfeld S. Physical Examination of the Spine & Extremities. 1976
6. Hoppenfeld S. Orthopedic Neurology: A Diagnostic Guide to Neurologic Levels. 1977
7. Magee D. Orthopedic Physical Assessment. 6<sup>th</sup> ed. 2013

REFERENCE TEXTS:

1. Biller J, DeMyer's The Neurologic Examination: A Programmed Test. 6<sup>th</sup> ed. 2011

MATERIALS:

**week 1: disposable pinwheel; 128 Hz tuning fork**  
**week 2: flexible tape measure**  
**week 4: reflex hammer**

METHOD OF INSTRUCTION: demonstration/explanation; practice

EVALUATION:

A Superior Work	90-100%
B Above Average Work	80-89%
C Average Work	70-79%
F Failure (the student must REPEAT the course)	below 70%
I Incomplete:	The student has failed to take all required exams and/or has failed to turn in other required work.
0 Overcut:	The student has accumulated more than the allowable absences in the course.

**Lab practical final - 100%**

**Most lab practical exams will occur during week 10, but with larger classes it is possible that some lab practical exams may be administered at another times during week 10 as schedules permit, or during finals week.**

**Your exam will consist of one (1) of the following 11 questions:**

1. Muscle *strength* testing for the upper extremity
2. Muscle *strength* testing for the lower extremity
3. Muscle **stretch** reflexes (MSR)/Deep Tendon Reflexes (DTR) for the upper extremity
4. Muscle **stretch** reflexes (MSR)/Deep Tendon Reflexes (DTR) for the lower extremity
5. Spinal nerve assessment (you will be assigned one spinal nerve, ex. C5 or C6, etc.)
6. Station & gait
7. Cerebellar function
8. Sensory testing – upper extremity
9. Sensory testing - lower extremity
10. Pathologic reflexes – lower extremity
11. Pathologic reflexes upper extremity (2 of 4) and Superficial reflexes (2 of 4)

**EXTRA CREDIT:** There will be no extra credit work permitted in this class.

**INDEPENDENT STUDENT WORK:** All exams must be the product of the individual student's original efforts for this class. Collaboration on other class assignments is permitted as defined by the instructor

**Grades and the Grading System Final Grades** are available online through the CAMS student portal. If there are any questions on grading procedures, computation of grade point average, or the accuracy of the grade report, please contact the Registrar's Office or the Office of Academic Affairs. Grades will be reported and evaluation will be based on the Academic Policies, Procedures, & Services. Please refer to Evaluation Policy (**Policy ID: OAA.0007**)

In order to maintain **Satisfactory Academic Progress**, a student must maintain a 2.0 or better in each and every course. **Any grade less than a C must be remedied by repeating the class.** Please refer to Satisfactory Academic Progress (**Policy ID: OAA.0006**)

**Attendance:** Please refer to Attendance Policy (**Policy ID: OAA.0002**)

**Conduct and Responsibilities:** Please refer to the Personal Conduct, Responsibility and Academic Responsibility Policy (**Policy ID: OAA.0003**)

**Make-up Exams:** Please refer to Make-up Assessment Policy (**Policy ID: OAA.0001**)

**Request for Special Testing:** Please refer to Request for Special Testing (**Policy ID: OAA.0004**)

**Accommodation for Students with Disabilities:**

If you have approved accommodations, please make an appointment to meet with your instructor as soon as possible. If you believe you require an accommodation, but do not have an approved accommodation letter, please see the Academic Counselor Lori Pino in the Office of Academic Affairs. Contact info: [Lpino@lifewest.edu](mailto:Lpino@lifewest.edu) or 510-780-4500 ext. 2061. Please refer to Service for Students with Disabilities Policy (**Policy ID: OAA.0005**)

**Electronic Course Management:**

**Canvas** is LCCW's Learning Management System (LMS). Canvas will be used throughout the quarter during this course. Lectures, reminders, and messages will be posted. In addition, documents such as the course syllabus and helpful information about the class project will be posted. Students are expected to check Canvas at least once a week in order to keep updated. The website address for Canvas is <https://lifewest.instructure.com/login/canvas> Please refer to the Educational Technologies Policy (**Policy ID: OAA.0009**)

**COURSE GOAL:** The goal of this course is to prepare the student to be able to perform a standard neurologic examination, and to understand normal & abnormal, and the significance of abnormal findings.

## COURSE OBJECTIVES:

- \*to demonstrate the basic procedures of the sensory examination: \*pain/temp  
\*tactile
- \*to demonstrate the muscle tests of the upper & lower extremities, and discuss their spinal nerve and peripheral nerve innervation
- \*to demonstrate the muscle tests of the lower extremity, and discuss their spinal nerve and peripheral nerve innervation
- \*to demonstrate the deep tendon reflexes of the upper & lower extremities, and discuss their spinal nerve and peripheral nerve innervation
- \*to demonstrate the basic procedures to assess coordination
- \*to demonstrate the basic procedures to assess balance
- \*to demonstrate the basic procedures to assess gait
- \*to demonstrate the pathologic reflex exams of the upper & lower extremities
- \*to demonstrate the superficial reflexes (abdominal & plantar)

## COURSE OUTLINE: (schedule adjustments will occur when lab days are cancelled)

### Week 1: sensory testing

- \*pinprick (**pinwheel**)
- \*vibration (**128 hz tuning fork**)
- \*light touch (**cotton Q-tip**)
- \*joint position sense (conscious proprioception)
- \*2-point discrimination

### Week 2: motor assessment - upper extremity

- \*inspection for atrophy & fasciculations
- \*muscle testing
- \*girth/circumference measurement (**flexible tape measure**)
- \*dynamometer testing of grip strength

### Week 3: muscle testing lower extremity

- \*inspection for atrophy & fasciculations
- \*muscle testing
- \*girth/circumference measurement (**flexible tape measure**)

### Week 4: deep tendon reflexes (reflex hammer)

### Week 5: Integration of sensory, motor, and reflex testing for assessment of spinal nerve and peripheral nerve function (**all above instruments needed**)

### Week 6: a. reflex examination – revisited

- (1) pathologic reflexes
- (2) clonus
- (3) superficial reflexes

- b. sensory examination – revisited
  - (1) cortical sensory tests (gnosis)

Week 7: \*balance assessment (Romberg test, etc.)  
\*gait assessment (regular, tandem, heel & toe walk)  
\*coordination

Week 8: Catch – up/Review

Prep for lab **practical (bring all instruments)**

Week 9: Catch – up/Review

Prep for lab **practical (bring all instruments)**

Week 10: **lab practical exams**

**Most lab practical exams will occur during week 10, but with larger class sizes it is possible that some lab practical exams may be administered at another time during week 10 as schedules permit, or during finals week.**

#### STUDENT LEARNING OUTCOMES (SLOs):

1. The student will be able to describe/demonstrate the procedures of a standard neurologic examination, including; [PLO: 1, 4, 8]
  - a. station and gait
  - b.. motor system
  - c. sensory system
  - d. reflexes
  - e. mental status and language (brief)
  - f. cranial nerves (covered in Exam: EENT)
2. The student will be able to describe/perform the sensory, motor, and reflex examination procedures to assess the neurologic function/integrity of spinal nerves, peripheral nerves, and the CNS. [PLO: 1, 4]
3. The student will be able to describe the normal & abnormal findings for each standard neurologic examination procedure, and discuss the significance of each abnormal finding. [PLO; 1, 3, 4, 7]

**Program Learning Outcomes (PLO):** Students graduating with a Doctor of Chiropractic degree will be proficient in the following:

1. **ASSESSMENT AND DIAGNOSIS:** An assessment and diagnosis requires developed clinical reasoning skills. Clinical reasoning consists of data gathering and interpretation, hypothesis generation and testing, and critical evaluation of diagnostic strategies. It is a dynamic process that occurs before, during, and after the collection of data through history, physical examination, imaging, laboratory tests and case-related clinical services.
2. **MANAGEMENT PLAN:** Management involves the development, implementation and documentation of a patient care plan for positively impacting a patient's health and well-being, including specific therapeutic goals and prognoses. It may include case follow-up, referral, and/or collaborative care.
3. **HEALTH PROMOTION AND DISEASE PREVENTION:** Health promotion and disease prevention requires an understanding and application of epidemiological principles regarding the nature and identification of health issues in diverse populations and recognizes the impact of biological, chemical, behavioral, structural, psychosocial and environmental factors on general health.
4. **COMMUNICATION AND RECORD KEEPING:** Effective communication includes oral, written and nonverbal skills with appropriate sensitivity, clarity and control for a wide range of healthcare related activities, to include patient care, professional communication, health education, and record keeping and reporting.
5. **PROFESSIONAL ETHICS AND JURISPRUDENCE:** Professionals comply with the law and exhibit ethical behavior.
6. **INFORMATION AND TECHNOLOGY LITERACY:** Information literacy is a set of abilities, including the use of technology, to locate, evaluate and integrate research and other types of evidence to manage patient care.
7. **CHIROPRACTIC ADJUSTMENT/MANIPULATION:** Doctors of chiropractic employ the adjustment/manipulation to address joint and neurophysiologic dysfunction. The adjustment/manipulation is a precise procedure requiring the discrimination and identification of dysfunction, interpretation and application of clinical knowledge; and, the use of cognitive and psychomotor skills.
8. **INTERPROFESSIONAL EDUCATION:** Students have the knowledge, skills and values necessary to function as part of an inter-professional team to provide patient-centered collaborative care. Inter-professional teamwork may be demonstrated in didactic, clinical or simulated learning environments.
9. **BUSINESS:** Assessing personal skills and attributes, developing leadership skills, leveraging talents and strengths that provide an achievable expectation for graduate success. Adopting a systems-based approach to business operations. Networking with practitioners in associated fields with chiropractic, alternative medicine and allopathic medicine. Experiencing and acquiring the hard business skills required to open and operate an on-going business concern. Participating in practical, real time events that promote business building and quantifiable marketing research outcomes
10. **PHILOSOPHY:** Demonstrates an ability to incorporate a philosophically based Chiropractic paradigm in approach to patient care. Demonstrates an understanding of both traditional and contemporary Chiropractic philosophic concepts and principles. Demonstrates an understanding of the concepts of philosophy, science, and art in chiropractic principles and their importance to chiropractic practice.

## INSTRUCTIONS FOR NEURO EXAM LAB PRACTICAL

### (REMEMBER TO PERFORM ALL TESTS BILATERALLY)

**Your exam will consist of one (1) of the following 11 questions:**

1. Muscle *strength* testing for the upper extremity
2. Muscle *strength* testing for the lower extremity
3. Muscle **stretch** reflexes (MSR)/Deep Tendon Reflexes (DTR) for the upper extremity
4. Muscle **stretch** reflexes (MSR)/Deep Tendon Reflexes (DTR) for the lower extremity
5. Spinal nerve assessment (you will be assigned one spinal nerve, ex. C5 or C6, etc.)
6. Station & gait
7. Cerebellar function
8. Sensory testing – upper extremity
9. Sensory testing - lower extremity
10. Pathologic reflexes – lower extremity
11. Pathologic reflexes upper extremity (2 of 4) and Superficial reflexes (2 of 4)

**Brief notes (please consult your lab manual & class notes for more information):**

**For items 1-4, in addition to demonstrating the test, you will need to** indicate the major nerve root innervation and peripheral nerve innervation. Additionally, you will need to know the grading scales, and significance of abnormal findings.

**For DTRs you will also need to** indicate knowledge of reinforcement procedures (even if you do elicit the reflex).

**For spinal nerve assessment** you will need to assess the sensory, motor, and reflex functions of the assigned spinal nerve. Sensory examination, at minimum, will need to consist of one test of pain/temp function (ex. pinwheel) and one test of tactile function (ex. vibration). You will also need to indicate normal & abnormal findings (including grading scales, as relevant), and significance of abnormal exam findings (ex. “radiculopathy due to either disc herniation or IVF stenosis”).

**For Station & Gait:**     \*balance standing, Romberg’s test  
                                  \*3 gait exams (regular, tandem, heel and toe)

**For Cerebellum:**        \*balance: briefly check standing and walking,  
                                  \*limb coordination testing UE/LE: point-to-point, & rapid alternating movement

- For Sensory testing:** \*pinwheel exam demonstrating dermatome & peripheral cutaneous innervations  
 \*vibration exam for fine tactile sensation  
 \*discriminative, cortical tests for sensory cortex (gnosis tests)

**For Pathologic reflexes and superficial reflexes:**

- a. pathologic reflexes: names, procedures, positive findings, significance
- b. superficial reflexes: names, procedures, positive findings, nerve root innervation

*You will have 5 minutes. Please prepare and practice so that you can complete your answers in the allotted time.*

<b>WEEKLY OUTLINE</b> <b>(subject to change due to holidays, school cancellations, etc.)</b>		
<b>WEEK</b>	<b>LECTURE</b>	<b>LAB</b>
Week 1	<ul style="list-style-type: none"> <li>a. syllabus and introduction to the course</li> <li>b. principles of neurologic examination and diagnosis               <ul style="list-style-type: none"> <li>(1) components of the complete patient assessment</li> <li>(2) components of the neurologic exam</li> <li>(3) components of the motor, sensory, and reflex examinations</li> <li>(4) summary of the neurologic exam</li> </ul> </li> <li>c. <b>diagnosis of radiculopathy</b> <ul style="list-style-type: none"> <li>(1) relationship between spinal nerves, vertebra, &amp; discs</li> <li>(2) spinal nerve (dermatome) and peripheral nerve sensory distributions</li> </ul> </li> </ul>	Sensory testing: <ul style="list-style-type: none"> <li>a. pinprick (<b>pinwheel</b>)</li> <li>b. temperature</li> <li>c. vibration (<b>128 tuning fork</b>)</li> <li>d. light touch (<b>wisp of cotton</b>)</li> <li>e. joint position sense (JPS)/ conscious proprioception</li> <li>f. 2-point discrimination (<b>paper clip and mm ruler</b>)</li> </ul>
Week 2	<ul style="list-style-type: none"> <li>a. <b>diagnosis of radiculopathy (continued)</b> <ul style="list-style-type: none"> <li>(1) motor and reflex functions of spinal nerves</li> <li>(2) radiculopathy case presentations and analysis - UE (Blumenfeld Chapter 8, etc.)</li> </ul> </li> </ul>	Motor assessment - upper extremity <ul style="list-style-type: none"> <li>a. inspection for atrophy and fasciculations</li> <li>b. girth/circumference measurement (<b>flexible tape measure</b>)</li> <li>c. muscle strength testing</li> <li>d. dynamometer testing of grip strength</li> </ul>



Week 3	a. <b>diagnosis of radiculopathy (continued)</b> (1) radiculopathy case presentations and analysis – LE (Blumenfeld Chapter 8, etc.)	Motor assessment - lower extremity a. inspection for atrophy and fasciculations b. girth/circumference measurement ( <b>flexible tape measure</b> ) c. muscle strength testing
Week 4	a. <b>Diagnosis of peripheral neuropathy</b> (1) review peripheral nerve anatomy & function (2) common peripheral entrapment compression neuropathies c. peripheral neuropathy case presentations and analysis	Deep tendon reflexes (DTRs) - upper and lower extremities ( <b>reflex hammer</b> )
Week 5	a. finish peripheral neuropathy case presentations and analysis, as nec. b. Q & A regarding radiculopathy & peripheral entrapment neuropathy diagnosis c. DDx radiculopathy & peripheral neuropathy d. sclerogenic (connective tissue) pain e. NMJ disease d. Myopathy g. S/S and examination findings that would suggest CNS pathology vs. PNS pathology (introduction) h. Q&A regarding assignment questions, as necessary i. final prep for MT1 <b>j. MT 1 (Thurs.):</b>	Integration of sensory, motor, and reflex testing for assessment of spinal nerve and peripheral nerve function <b>(all above instruments needed)</b>
Week 6	CNS aspects of motor control a. review UMN and LMN anatomy b. characteristics of UMN and LMN lesions c. examples of UMN & LMN lesions	a. reflex examination – revisited (1) pathologic reflexes (2) clonus (3) superficial reflexes  b. sensory examination – revisited (1) cortical sensory tests (gnosis)

Week 7	<p>CNS aspects of motor control (continued)</p> <ul style="list-style-type: none"> <li>a. station/Romberg test</li> <li>b. gait</li> <li>c. coordination of the limbs <ul style="list-style-type: none"> <li>(1) review relevant cerebellar anatomy</li> <li>(2) examination procedures</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>a. station &amp; Romberg test</li> <li>b. gait (regular, tandem, heel-to-toe)</li> <li>c. coordination of the limbs</li> </ul>
Week 8	<p>CNS aspects of motor control (continued)</p> <ul style="list-style-type: none"> <li>a. muscle bulk</li> <li>b. muscle tone</li> <li>b. involuntary movements</li> <li>c. Basal Ganglia anatomy review</li> </ul> <p>CNS aspects of somatosensory transmission</p> <ul style="list-style-type: none"> <li>a. dorsal column-medial lemniscus (tactile pathway)</li> <li>b. anterolateral system (P/T pathway)</li> <li>c. cortical discriminative sensation (gnosis)</li> </ul>	<p>Catch - up / review</p> <p>Prep for lab practical exams (bring all instruments)</p>
Week 9	<p>CNS aspects of somatosensory transmission (continued)</p> <p><b>MT2 (Thurs)</b></p>	<p>Catch –up / review</p> <p>Prep for lab practical exams (bring all instruments)</p>
Week 10	<p>CNS effects on reflex activity</p> <ul style="list-style-type: none"> <li>a. deep tendon reflexes</li> <li>b. pathologic reflexes</li> <li>c. superficial reflexes</li> </ul> <p>Mental status and language</p>	<p><b>Lab practical exams</b></p>
Week 11	<p><b>Final</b></p>	<p><b>Lab practical exams (continued, as necessary due to class size)</b></p>