

SYLLABUS

Name of Course: Practical Radiology – ACS 407

Length of Course: 2 units, 33 hours

Course Description: This course is directed to the understanding of Magnetic Resonance Imaging of the spine and instability of the spine. Upright and recumbent MRI, video-fluoroscopy, and plain film x-ray evaluation is discussed.

Prerequisites: ACS - 208

Course Offered By: Clinical Sciences Department

Required Text: Yochum TR: *Essentials of Skeletal Radiology*, 3rd Ed. 2005

Recommended Text: Lothar Wicke: *Atlas of Radiologic Anatomy*, 7th Ed. 2004 Taylor and Resnick: *Skeletal imaging 2010*

Reference Materials: Notes on reserve in the library

Materials: MRI films on file in the library. Digital motion x-ray CD on file in the library

Methods of instruction: Lecture – discussion; case presentation.

The evaluation/grading criteria: The course will have two laboratory examinations 50 points each and a written final of 100 points value. In class quizzes will be graded at 5 points each and are in addition to the following.

Midterm 100pts

Final 100 pts

3 in class exercises 25 pts each

Canvas discussions total 25 pts

A=300-270

B=269-240

C=239-210

F=209 and below

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 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 objectives:

Course Goals: The goal of this course is to prepare the student to perform a basic interpretation of an MRI study.

Course Objectives:

Week 1: To introduce the physics of magnetic resonance imaging (MRI).
To introduce anatomy as identified on MRI.

Physical principles

- | | | |
|--------------------|------------------------|----------------------|
| 1. Hydrogen proton | 2. Magnetic field | 3. Excitation |
| 4. Relaxation | 5. T1 weighted image | 6. T2 weighted image |
| 7. TR | 8. TE | 9. Gradient echo |
| 10 Spin echo | 11. Inversion recovery | 12. Artifacts |

Week 2: *In class exercise on the physics of MRI*

To introduce normal anatomy of the lumbar, thoracic and cervical spine as noted on MRI images including transverse, sagittal and coronal images.

Week 3: *In class exercise on Anatomy*

To introduce disc herniation of the lumbar, thoracic, and cervical spine.

To introduce the standard nomenclature used to define the nature and severity of a herniation.

Disc nomenclature:

1. Normal disc
2. Annular bulge
3. Annular tear
4. Broad based disc protrusion
5. Focal disc protrusion
6. Prolapse
7. Extrusion
8. Subligamentous disc herniation
9. Transligamentous disc herniation
10. Sequestered disc

Week 4: To introduce interpretation of MRI images.

Class activity – MRI interpretation

Principles of MRI interpretation:

1. Identify imaging sequences provided
2. Evaluate T2 weighted sequence
 - a. begin at mid sagittal image
 - b. evaluate all images sequentially
3. Evaluate T1 weighted sequence
 - a. begin at mid sagittal image
 - b. evaluate all images in sequence
4. Evaluate other imaging sequences
5. Correlation of imaging findings with patient history and physical examination findings to the most likely diagnosis.

Week 5: In class exercise: *disk nomenclature*

To introduce degenerative joint disease as identified on MRI and CT studies.

To introduce stenosis at the central canal and neuroforaminal level

Degenerative joint disease

1. Dysfunctional phase
2. Unstable phase
3. Stabilization phase

Week 6: To introduce spinal instability

Spinal instability on x-ray

1. Translation
2. Angular motion

Spinal instability up on D M X

1. Translation
2. Shear
3. Engagement pattern
4. Angular deformity
5. Facet joint gapping
6. Symmetry of motion

Spinal instability on kinematic MRI

1. Translation
2. Angular deformity
3. Change in disc morphology or signal intensity
4. Increased joint fluid
5. Ligamentous buckling
6. Paraspinal muscle change

Week 7: In class exercise: *instability*

To introduce MRI and CT of the brain

To introduce MRI and CT of spinal tumors and infections.

Tumors:

1. Bone tumors
2. Extradural masses
3. Intradural extramedullary masses
4. Intramedullary masses
5. Spondylodiscitis

Week 8: To introduce MRI of the extremities

Conditions visible on MRI

1. Rotator cuff tear
2. Meniscal tear
3. Bone contusion
4. Ligament/capsular tear

Week 9: In class exercise in interpretation of MRI and

CT

Week 10: To review material presented and prepare for

final **Week 11: *Final – multiple choice***

Student Learning Outcomes

1. The student will be able to use correct terminology to define MRI sequences. (PLO:1)
2. The student will be able to define and discuss the T2 weighted image (PLO:1)
3. The student will be able to define and discuss the T1 weighted image (PLO:1)
4. The student will be able to identify and differentiate normal and abnormal disc morphology including herniations. (PLO:1,2)
5. The student will be able to define and discuss instability of the spine (PLO:1,2)
6. The student will be able to interpret an MRI imaging study and correlate findings to the patient presentation. (PLO: 2)

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.