## SYLLABUS

<table>
<thead>
<tr>
<th>Name of Course:</th>
<th>RADIOLOGY 1A (ACS-309)</th>
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<tbody>
<tr>
<td>Length of Course:</td>
<td>1.5 units, 22 hours (2 hrs. lec/wk.)</td>
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<tr>
<td>Course Description:</td>
<td>First in a series of radiology diagnosis courses, this class is designed to acquaint the student with basic spinal, thorax and abdominal radiographic anatomy. The course covers normal radiographic anatomy, roentgenometrics, skeletal development and common normal variants.</td>
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<tr>
<td>Prerequisites:</td>
<td>ANAT-111, ANAT-118</td>
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<td>Course Offered By:</td>
<td>Clinical Sciences Department</td>
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| Required Text: | Class notes – Available in the bookstore  
| Recommended Text: | Sandrack AR. *The Radiologic Clinics of North America*. (on reserve)  
1977 Aug; 15(2); 133-154, 167-175 (WE 725 S96 1977) |
Moeller TB. *Normal Findings in Radiography*. 2000 |
| Materials: | X-ray films: Normals are color-coded. ACR file. |
| Method of Instruction: | Lecture – demonstration, power point presentation, laboratory exercises |
| Evaluation: | Written Midterm (50%) = 50 points  
Written Final (50%) = 75 points |
| Testing: | Exams in this course will begin on time. You are advised to show up a few minutes early if possible. |

Approved OAA/Department | December 2019
Quarter grades will be assigned according to the following percentage ranges:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>A</td>
<td>Superior work</td>
<td>90-100%</td>
</tr>
<tr>
<td>B</td>
<td>Above average work</td>
<td>80-89%</td>
</tr>
<tr>
<td>C</td>
<td>Average work</td>
<td>70-79%</td>
</tr>
<tr>
<td>F</td>
<td>Failure</td>
<td>0-69%</td>
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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)

Extra Credit: There will be no extra credit work permitted in this class.

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 Goals: The goals of this course are to familiarize students with radiographic anatomy, to teach a systematic approach to reading x-rays (plain & digital), and to teach students to identify normal and normal variant findings and to distinguish them from early and late pathology.

Course Objectives:

1. General concepts in radiography
   a. Wilhelm Roentgen discovered x-rays in 1895 in Germany
      i. Won 1st Nobel prize in physics for discovery
   b. Radiography-most utilized imaging modality
      i. Many application
         1. Human tissue
            a. Skeleton
            b. Extremities
            c. Chest
            d. Abdomen
         2. Industrial applications
         3. Military application
         4. Non-human imaging
   c. Radiographic Densities
      i. Radiolucent – Black
      ii. Radiopaque – White
   d. Radiolucent--------------------------- Radiopaque
      i. Air/Gas – Trachea, lungs, bowel gas,
      ii. Fat/Oil – Fat planes, subcutaneous fat
      iii. Water – Muscles, organs, medullary cavity
      iv. Bone/Calcium – Cortical bone, calcification, teeth
      v. Metal – Dental fillings, surgical staples, orthopedic hardware, jewelry
   e. X-ray Interaction with tissue
      i. X-rays are produced in the x-ray tube and travel toward patient
      ii. Some x-rays are absorbed, some are transmitted
      iii. X-rays that hit the receptor (radiographic film, digital plate) darken the receptor
      iv. Minimally dense tissue appears dark on x-rays because most x-rays made it through the tissue
      v. More dense material appears white on x-ray because most x-rays are absorbed

2. Bone
   a. Functional Components of Bone
      i. Cortex/Cortical Bone
         1. Dense outer shell of bone
      ii. Trabecular/Spongy/Cancellous bone
         1. Porous internal bone
         2. Houses bone marrow
iii. Periosteum
   1. Membrane covering cortex of bone (except articular surfaces)
      a. Responsible for appositional bone growth (width)
      b. Outer layer-fibrous, vascular
      c. Inner layer- osteoblastic/osteoclastic activity

iv. Endosteum
   b. Structural components of long bones
      i. Diaphysis (shaft)
      ii. Metaphysis
      iii. Growth plate/Physis/Epiphyseal Growth plate
      iv. Epiphysis
      v. Apophysis

3. General concepts in film evaluation
   a. 4 category of film evaluation (ABCS)
      i. A-Alignment, Anomalies, Anatomy
      ii. B-Bone
      iii. C-Cartilage
      iv. S-Soft tissues
   b. Consider anatomic region of evaluation
      i. Bony structures
         1. Type of bones present (flat vs long bones)
         2. Normal in configuration/Appearance
         3. All parts present
         4. Radiopaque
      ii. Joints
         1. All joints present
         2. Joint height/width
         3. Radiolucent
      iii. Viscera/soft tissues
         1. Surrounding tissue
         2. Intermediate radiographic density

SPINE
4. Cervical Spine
   a. Views
      i. Standard
         1. AP
         2. APOM
         3. Lateral
      ii. Accessory
         1. Stress Views
            a. Flexion/Extension
         2. Obliques
         3. Pillar Views
         4. Swimmers Lateral
iii. Upper Cervical Specific
   1. Nasium
   2. Vertex
   3. Base Posterior
   4. Stereo Shift

b. Normal structures
   i. Skull
      1. Occiput
      2. Base
      3. Foramen Magnum
      4. Opistion
      5. Basion
      6. Sella turcica
      7. Clivus
      8. Hard palate

ii. Mandible
    1. Ramus
    2. Angle
    3. Body

iii. Spine
    1. C1
       a. Anterior arch
          i. Anterior tubercle
       b. Posterior arch
          i. Posterior tubercle
       c. Lateral masses
          i. Transverse processes
             1. Transverse foramina

    2. C2
       a. Body
       b. Dens
       c. Pedicles
       d. Articular pillar
       e. Lamina
       f. Spinous
       g. Transverse process

    3. C3-C7
       a. Vertebral body
       b. Pedicles
       c. Articular pillar
       d. Lamina
       e. Spinous process
       f. Transverse process
          i. Transverse foramina
       g. Uncinate processes
h. Semilunar facets
d. Lines of mensuration

c. Joints

vi. Trachea
vii. thyroid cartilage
viii. Hyoid bone

d. Lines of mensuration

i. McGregor's line
ii. Chamberlain's line
iii. Cervical lordosis
iv. Cervical gravity line
v. Ruth Jacksons lines
vi. Georges line
vii. Spinolaminar junction line/Posterior cervical line

e. Congenital anomalies/Normal Variants

i. Paracondylar process
ii. Epitransverse process
iii. Third Condyle
iv. Occipitalization
v. Posterior arch agenesis
   1. Partial
   2. Complete
vi. Os terminale of Bergman
vii. Os Odentoidieum
viii. Congenital Block vertebra
ix. Hemivertebra
x. Congenital spondylolisthesis
xi. Cervical ribs
xii. Spina bifida
   1. Occulta
   2. Vera

f. Abnormalities

i. Upper cervical instability
ii. Dens fracture
iii. Osteoarthritis

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iv. Stylohyoid ligament calcification
   1. Eagles syndrome

5. Thoracic spine
   a. Views
      i. Standard
         1. AP
         2. Lateral
      ii. Accessory
         1. Swimmers lateral
   b. Normal structures
      i. Spine
         1. Vertebral body
         2. Pedicle
         3. Articular pillar
         4. Lamina
         5. Spinous process
         6. Transverse processes
      ii. Ribs
         1. Head
         2. Angle
         3. Posterior
         4. Anterior
      iii. Soft tissues of thorax
         1.
   c. Joints
      i. Intervertebral
      ii. Facet
      iii. Costovertebral
      iv. Costotransverse
   d. Lines of mensuration
      i. Thoracic Kyphosis
      ii. Scoliosis angle
         1. Cobbs angle (preferred)
         2. Risser Ferguson
   e. Congenital anomalies/Normal Variants
      i. Hemivertebra
      ii. Butterfly vertebra
      iii. Pedicle agenesis
      iv. Un-united secondary ossification centers
   f. Abnormalities
      i. Schmorls nodes
      ii. Scheurmanns disease
      iii. Scoliosis
      iv. Pectus Excavatum
6. Lumbar spine
   a. Views
      i. Standard
      ii. Accessory
   b. Normal structures
   c. Joints
   d. Lines of mensuration
   e. Lumbar lordosis
   f. Lumbar gravity line
   g. Ullmans line
   h. Hadleys S curve
   i. McNabbs Line
   j. Meyerdings method
   k. Congenital anomalies/Normal Variants
      i. Lumbosacral transitional segments
      ii. Nuclear Impression
         1. Cupids bow deformity
      iii. Limbus bone
      iv. Schmorls nodes
   l. Abnormalities
      i. Spondylolisthesis
         1. Wiltse Classification
            a. Dysplastic
            b. Isthmic
            c. Degenerative
            d. Traumatic
            e. Pathologic
            f. Iatrogenic
      ii. Osteoarthritis

7. Pelvis
   a. Views
      i. AP Pelvis
   b. Normal structures
      i. Femur
         1. Shaft
         2. Neck
            a. Subcapital
            b. Midcervical
            c. Basicervical
         3. Head
            a. Fovia Capitis
4. Trochanters
   a. Greater
   b. Lesser

ii. Ilium
   1. Fossa
   2. Crest
   3. ASIS
   4. AIIS
   5. PSIS
   6. PIIS

iii. Ischium
   1. Spine
   2. Tuberosity

iv. Pubis
   1. Body
   2. Superior ramus
   3. Inferior ramus

v. Sacrum
   1. Sacral foramina
      a. Anterior
      b. Posterio
   2. Spines/Ridge
   3. Base
   4. Apex
   5. Ala

vi. Ischiobubic junction

vii. Obturator foramen

viii. Acetabulum

c. Joints
   i. Sacroiliac
   ii. Femoroacetabular
      1. Superior
      2. Axial
      3. Medial
   iii. Pubis symphysis

d. Lines of mensuration
   i. Pelvic/femoral head unleveling
   ii. Risser sign

e. Congenital anomalies/Normal Variants
   i. Caudal regression syndrome
   ii. Paraglenoid sulci

f. Abnormalities
   i. Osteitis condensans ilii
   ii. SI ankylosis
   iii. Protrusio acetabuli
iv. Pelvic avulsion fractures

8. Thorax
   a. Views
      i. Chest
         1. PA
         2. Lateral
         3. Accessory: Apical Lordotic
      ii. Ribs
         1. AP
         2. PA
         3. Obliques
   b. Normal structures
      i. Clavicles
      ii. Scapula
      iii. Ribs
      iv. Sternum
      v. Diaphragms
      vi. Trachea
      vii. Heart
      viii. Aorta
      ix. Hila
      x. Lungs
      xi. Spine
      xii. Cardiophrenic angles
      xiii. Costophrenic angles
         1. Lateral
         2. Posterior
      xiv. Retrosternal clear space
      xv. Retrocardiac clear space
   c. Lines of mensuration
   d. Congenital anomalies/Normal Variants
      i. Rib synostosis
      ii. Diaphragm eventration
      iii. Pectus excavatum
      iv. Azygous lobe
   e. Abnormalities
      i. Atelectasis
      ii. Pneumothorax
      iii. Rib fracture
      iv. Pancoast tumor/Superior sulcus tumor

9. Abdomen
   a. Views
      i. Standard
1. AP (recumbent)
2. Lateral

ii. Accessory
   1. Barium contrast
   2. KUB

b. Normal structures
   i. Diaphragm
   ii. Liver
      1. Medial border
      2. Lateral border
   iii. Gallbladder
   iv. Pancreas
   v. Spleen
   vi. Bowel
      1. Small
      2. Large
         a. Ascending
         b. Transverse
         c. Descending
         d. Sigmoid
         e. Rectal
         f. Hepatic flexure
         g. Splenic flexure

vii. Bladder
viii. Kidneys
ix. Stomach
x. Psoas musculature
   1. Magenblasse

c. Lines of mensuration

d. Congenital anomalies/Normal Variants
   i. Riedels lobe

e. Abnormalities
   i. Choleliths/Gallstones
   ii. Nephroliths/Kidney stones
   iii. Phleboliths
   iv. Bowel Obstruction
   v. Abdominal ileus

**Student Learning Outcomes (SLO):**

1. Students will be able to use a systematic procedure for reading x-ray films. (PLO:1)

2. Students will be able to identify the standard radiographs for each part of the skeleton. (PLO:1)
3. Students will be able to recognize and identify normal anatomic structures of the skeleton, chest, abdomen and identify common normal variants.(PLO:1)

4. Students will be able to recognize and use generic lines of mensuration as part of film analysis. (PLO:1)

5. Students will be able to recognize skeletal abnormalities by virtue of knowing the normal appearance of skeletal structures.(PLO:1)

**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.

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