

SYLLABUS

Name of Course:	RADIOLOGY 1A (ACS-309)
Length of Course:	1.5 units, 22 hours (2 hrs. lec/wk.)
Course Description:	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.
Prerequisites:	ANAT-111, ANAT-118
Course Offered By:	Clinical Sciences Department
Required Text:	Class notes – Available in the bookstore Yochum TR. <i>Essentials of Skeletal Radiology</i> . 3 rd ed. 2005
Recommended Text:	Sandrack AR. <i>The Radiologic Clinics of North America</i> . (on reserve) 1977 Aug; 15(2); 133-154, 167-175 (WE 725 S96 1977)
Reference Texts:	Keats TE. <i>Atlas of Normal Roentgen Variants that May Simulate Disease</i> . 8 th ed. 2007 Moeller TB. <i>Pocket Atlas of Radiographic Anatomy</i> . 2 nd ed 2000 Wicke L. <i>Atlas of Radiologic Anatomy</i> . 7 th ed. 2004 Moeller TB. <i>Normal Findings in Radiography</i> . 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.

Quarter grades will be assigned according to the following percentage ranges:

A	(4.0) Superior work	90-100%
B	(3.0) Above average work	80-89%
C	(2.0) Average work	70-79%
F	(0.0) Failure	0-69%

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
 - i. Spinolaminar junction line
 - iv. Ribs
 - v. Lung apices
 - vi. Trachea
 - vii. Thyroid Cartilage
 - viii. Hyoid bone
- c. Joints
 - i. Atlantooccipital
 - ii. Atlantoaxial
 - iii. Atlantodental
 - iv. Paraodontoid spaces
 - v. Facet/Zygapophyseal
 - vi. Uncovertebral/Luschka
 - vii. Costotransverse
 - viii. Intervertebral
- d. Lines of mensuration
 - i. McGregors line
 - ii. Chamberlains 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 Odontoidieum
 - 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

- 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. Hemiverterbra
 - 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. Posterior
 - 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.