Syllabus Radiology Clerkship

<table>
<thead>
<tr>
<th>Course No:</th>
<th>OM 7020, 7021, 7022</th>
<th>Course Title:</th>
<th>Radiology Clerkship (Elective)</th>
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</thead>
<tbody>
<tr>
<td>Credit Hours:</td>
<td>2-4 weeks, 2-4 credit hours for each rotation (only OMIV can do 2 week rotations)</td>
<td>Clerkship Director:</td>
<td>Department Chair:</td>
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<tr>
<td>Term - Dates:</td>
<td>Variable in OMS III, OMSIV academic year</td>
<td>Level:</td>
<td>OMS III-IV</td>
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Department of Clinical Education Contact Information

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Educational Goal

Purpose of the Rotation
The Radiology Rotation is designed to provide students with a structured overview of the breadth of diagnostic imaging, invasive radiology and an introduction to the fundamentals of diagnostic radiology. They will also gain insight into the diagnostic limitations of imaging studies and how these parameters affect patient care.

The student will develop an understanding of the differences between each of the imaging modalities, the indications and contraindications for each, and the operation of radiologic subspecialties in the context of patient care.
**Radiology (2-4 credit hours)**

The medical student will develop an appreciation of the complexity of diagnostic imaging including an understanding of the types of imaging available and the information they can provide. The students will also gain an understanding of the clinical indications for obtaining studies, the relative risk/benefit of radiologic procedures and the basic technical aspects of how examinations are performed. They will also gain insight into the diagnostic limitations of imaging studies and how these parameters affect patient care.

The student will develop an understanding of the differences between, each of the imaging specialties and the operation of these radiologic subspecialties in the context of patient care.

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**Radiology Clerkship Learning Objectives**

The student will be expected to:

1. List the indications for the most commonly performed imaging examinations.
2. Learn the different types of contrast media, the indications and contraindications for the usage of them.
3. Identify the most commonly performed imaging exams and their importance in clinical patient management.
4. Demonstrate knowledge of human anatomy by recognizing key structures on various imaging modalities. (COMP/AOA core competencies 2; Institutional outcomes 1, 2).
5. Advise patients and colleagues on the risks, benefits, limitations and indications of each of the most commonly performed imaging examinations. Understand the ACR Appropriateness Criteria.
6. Identify critical and high priority imaging findings on the most commonly performed imaging exams and discuss their importance in clinical patient management.
7. Identify the most commonly performed imaging exams and their importance in clinical patient management.
8. Demonstrate understanding of the important role of communication in radiology with specific emphasis on the radiology report, urgent or unexpected findings, recommendations for follow-up imaging or procedures, and doctor patient communication. (COMP/AOA core competencies 2, 3; Institutional outcomes 1, 2, 3, 4, 7)
9. Build a model for solving imaging related problems that effectively integrates indications for imaging, evidence-based uses for imaging, analysis of imaging findings and generation of an imaging differential diagnosis.
10. Develop an algorithm for dealing with the monitoring and follow-up of incidental radiologic findings that are not related to the patient's current clinical picture.
11. Understand the role of the radiologist in the care of patients undergoing imaging evaluation or image guided procedures by participating in interactive image interpretation sessions.
12. Understand how to prepare patients for radiology studies (dealing with allergies, contrast reactions, MRI safety, Radiation safety and protection).
13. Interact with the technologists for each modality to arrive at a basic understanding of their roles in the imaging process.
14. Understand Basic radiologic principles and physics.

15. Learn how to access and use radiology and reporting systems (eg PACS).

16. Identify knowledge deficits and search the medical literature for the most current aspects of diagnostic and treatment strategies to apply the principles of evidence-based medicine to the care of the individual medical patient. (COMP/AOA core competencies 2, 6, 7; Institutional outcomes 1, 2, 6, 7)

17. Integrate concepts of epidemiology and biostatistics (sensitivity/specificity/positive and negative predictive value) into the care of the individual medical patient. (COMP/AOA core competencies 2, 4, 6, 7; Institutional outcomes 1, 2, 7)

18. Formulate diagnostic and treatment plans taking into consideration cost-benefit analysis and access to healthcare. (COMP/AOA core competencies 2, 4, 6, 7; Institutional outcomes 1, 2, 4, 5, 6, 7, 8)

19. Respect the cultural and ethnic diversity of their patients’ beliefs in evaluating and managing their medical care. (COMP/AOA core competencies 1, 2, 3, 4, 5; Institutional outcomes 2, 3, 4, 5, 6, 8)

20. Display honesty, integrity, respect, and compassion for patients and their families. (COMP/AOA core competencies 1, 2, 3, 4, 5; Institutional outcomes 23, 4, 5, 6, 8)

21. Display collegiality, professionalism and respect toward all members of the healthcare team. (COMP/AOA core competencies 4, 5, 7; Institutional outcomes 3, 4)

22. Follow all infection control policies and guidelines as established by the Centers for Disease Control and Prevention (CDC) and the Society for Healthcare Epidemiology of America (SHEA). (COMP/AOA core competencies 2, 4, 6, 7; Institutional outcomes 1, 2, 7)

23. Apply Osteopathic Principles and Practice as an integral part of patient treatment and care. (COMP 1,2,3,4,5, 6,7; Institutional Outcomes 1,2,3,4,5,6,7,8)

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**Rotation Expectations**

1. Accompany attendings, residents and interns as directed.
2. Effectively communicate with attendings, residents and interns about patients and studies.
3. Participate in all conferences, morning reports, lectures, Tumor Boards and meetings as directed by the attending and COMP faculty.
4. Lecture or present case histories/topics as requested by interns, residents or attending.
5. Complete reading assignments as directed by your attendings and required educational assignments/ECM assignments as directed by COMP.
6. Use the literature to review evidence-based diagnosis and management of cases encountered on the service.
7. Be timely.
8. Wear appropriate attire.
9. Be professional at all times.

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**Required Educational Assignments**

1. [https://www.med-ed.virginia.edu/courses/rad/](https://www.med-ed.virginia.edu/courses/rad/) with post tests
   - Introduction to chest Radiology
   - Introduction to Gastrointestinal Radiology
   - Introduction to Pediatric Radiology
   - Skeletal trauma Radiology
2. SonoSim US cases as directed by ECM
3. As directed by your attendings, residents or interns.
Recommended Topics in Radiology

Cardiothoracic Imaging

1. Identify the different radiographic views of the chest (AP, PA, Lateral, Decubitus, Inspiratory/Expiratory, Cross-table lateral) and describe clinical benefits and limitations of each.

2. Employ a systematic search pattern for interpreting chest radiographs.

3. List different types of pathologies that can produce focal "opacity" on chest radiographs.

4. Discuss the radiographic findings that may help characterize lung opacity as atelectasis.

5. Discuss the radiographic findings that help characterize lung opacity as "consolidation" and formulate a differential diagnosis based on CXR findings.

6. Describe signs of and be able to identify pneumothorax, pneumomediastinum, and pneumopericardium on chest radiographs.

7. Learn to describe osseous and soft tissue findings on CXR exams.

8. Differentiate between pulmonary vascular congestion, interstitial pulmonary edema, and alveolar edema on chest radiographs.

9. Discuss the criteria for diagnosis of cardiomegaly on chest radiographs.

10. Recognize the correct positioning of venous lines, arterial lines, and endotracheal tubes on chest radiographs.

11. Discuss the role of CT in evaluating the chest.

12. Compare the conspicuity of chest “masses” on CXR and CT.

13. Discuss the utility of Fleischner Society guidelines in management of solitary pulmonary nodules seen on CT.

14. Describe imaging modalities available for imaging the heart and great vessels.

15. Identify the appropriate indications for cardiac CT, cardiac MRI, thoracic CT angiography and the role of NUCLEAR MEDICINE in the cardiothoracic workup.

16. Identify the appropriate indications for cardiac CT, cardiac MRI, and thoracic CT angiography.

17. Choose an appropriate imaging algorithm for common diagnostic scenarios including:

   o Suspected pneumonia
   o Suspected pulmonary embolism
   o Solitary pulmonary nodule
   o Suspected aortic dissection

Abdominal Imaging

1. Identify the different radiographic views of the abdomen (KUB, upright and supine AP, Decubitus) and describe the utility of each.

2. Employ a systematic search pattern for interpreting abdominal radiographs.

3. Recognize free intra-abdominal air on radiographs and describe how patient positioning affects sensitivity for detection.
4. Differentiate between dilated small bowel and large bowel on radiographs.

5. Describe indications for GI fluoroscopy procedures.

6. Describe indications for GI fluoroscopy procedures including the reasons for utilization of barium versus water soluble agents.

7. Recommend appropriate cross-sectional imaging modality (CT vs. MRI) for given abdominal complaints including appropriate use of contrast, when necessary.

8. Describe appropriate indications for common ultrasound studies.

9. Describe clinical situations in which ultrasound is used to guide interventional procedures.

10. Recognize the correct and incorrect position of feeding tubes.

11. Construct the appropriate imaging algorithm for common diagnostic scenarios including:
   - Suspected SBO
   - Right upper quadrant pain
   - Renal colic
   - Suspected acute appendicitis
   - Suspected pancreatitis
   - Suspected diverticulitis
   - Pelvic pain in women of child-bearing age

**Musculoskeletal Imaging**

1. Create an imaging plan to evaluate patients with acute musculoskeletal trauma.

2. Explain the critical utility of obtaining multiple radiographic views in fracture evaluation.

3. Accurately and succinctly describe fractures based on their radiographic appearance.

4. Identify and explain the significance of intra-articular fracture extension.

5. Identify an elbow joint effusion on radiographs and provide a differential diagnosis based on patient presentation.

6. Identify glenohumeral dislocation on radiographs and differentiate between anterior and posterior dislocation.

7. Explain the important role of radiographs in the evaluation of MSK problems.

8. Understand the differences in imaging protocols as related to the clinical indication (e.g., traumatic neck pain vs. radiculopathy)

9. Learn what examinations are considered unnecessary in certain skeletal clinical scenarios (see "Fundamentals of Skeletal Radiology, 4e" by Clyde Helms, MD)

10. Identify the important radiographic landmarks used to evaluate the cervical spine in the setting of acute trauma.

11. Discuss indications for CT and MRI for spine and differentiate this from the use of these modalities in the evaluation of extremity trauma.

12. Identify thoracic and lumbar spine fracture patterns based on imaging appearance and mechanism of injury.
13. Discuss most common associated injuries and predisposing conditions for various spinal injury types.

14. Describe the classic features of osteoarthritis and contrast these with the features of rheumatoid arthritis, seronegative spondylo-arthritis, gout, and erosive osteoarthritis.

15. Characterize arthritis patterns based on the radiographic appearance of patients with joint pain.

16. Construct the appropriate imaging algorithm for common diagnostic scenarios including:
   - Chronic or acute joint pain
   - Extremity trauma
   - Spinal trauma
   - Acute hip pain
   - MSK infection
   - MSK Neoplasm

**Pediatric Imaging**

1. Discuss the unique challenges faced when imaging children and how these may affect choice of imaging modality.

2. Contrast normal chest radiographic anatomy of an infant compared to that of an adult.

3. Discuss indications for ordering Upper GI and Contrast enema in newborn infants.

4. Identify normal bowel rotation on Upper GI.

5. Discuss pathophysiology, imaging findings, and treatment of ileocolonic intussusception.

6. Describe steps of a voiding cystourethrogram (VCUG) and discuss utility of imaging study in pediatric patient with febrile UTI.

7. Recognize growth plates as a normal finding in pediatric MSK imaging.

8. Explain the significance of physeal involvement of a fracture.

9. Identify injuries that raise suspicion for non-accidental trauma.

10. Localize the position of vascular lines, endotracheal tubes, and feeding tubes in pediatric patients and identify misplaced devices.

11. Construct the appropriate imaging algorithm for common diagnostic scenarios including:
   - Bilious vomiting in newborn infant
   - Suspected pyloric stenosis
   - Suspected intussusception
   - Limping child
   - First febrile UTI
   - Suspected non-accidental trauma
   - Hirschsprung’s disease

**Breast Imaging**
1. Explain how a mammogram is performed in terms a patient would understand.

2. Differentiate between CC and MLO positioning on a mammogram.

3. Explain the rational for breast compression in mammography.

4. Describe the four major mammographic imaging findings.

5. Discuss current recommendations for screening mammography.

6. Compare the role of screening mammography vs diagnostic mammography and list the indications for a diagnostic mammogram.

7. Summarize the risks and benefits of screening mammography.

8. Discuss the utility of the BI-RADS atlas and how it standardizes terminology, assessment, and treatment and follow-up imaging recommendations.

9. Describe the utility of ultrasound in the work-up of a breast mass.

10. List indications for breast MRI.

11. Construct the appropriate imaging algorithm for common diagnostic scenarios including:

   - Palpable breast mass in young female
   - Palpable breast mass in older female
   - Young female with family history of BRCA-1 gene mutation

**Interventional Radiology**

1. Explain the indications for commonly performed Interventional Radiology procedures including transjugular intrahepatic portocaval shunt (TIPS), percutaneous nephrostomy, abscess drainage, tumor ablation and embolization, central venous access, vascular occlusion, IVC filter placement, and re-vascularization techniques.

2. Advise patients of the preparation regimen for the most commonly performed interventional procedures including necessary laboratory studies and their reference values as well as pertinent patient precautions and restrictions.

3. Assess the position of central venous and drainage catheters on imaging studies and successfully identify malpositioned devices.

4. Name and identify important complications following interventional radiology procedures including retroperitoneal hematoma, pseudoaneurysm, arterial dissection, thromboembolism, and AV fistula.

5. Describe how different imaging modalities are used to guide interventional and diagnostic procedures.

6. Understand the placement of peripherally inserted central catheters (PICC)

**Nuclear Medicine**

1. Educate patients on the basic differences between general nuclear medicine studies and radiography including the basic functions of the gamma camera and radionuclides.

2. Recognize images from common Nuclear medicine studies including bone scan, GI bleeding study, V/Q scan, Cardiac stress test, and PET/CT.

3. Discuss benefits and limitations of common Nuclear Medicine studies.
4. Discuss the risks and benefits of nuclear imaging in the pregnant patient, mothers who are breast feeding and women of child bearing age.

5. Discuss role of PET/CT exam in evaluation of metastatic disease and seizure disorders.

6. Construct the appropriate imaging algorithm for common diagnostic scenarios including:
   - Acute cholecystitis
   - GI bleed
   - Suspected occult fractures
   - Suspected pulmonary embolism
   - Evaluation of metastatic disease

**Ultrasound Skills**

1. Describe the basic physics behind ultrasound image acquisition.

2. Successfully acquire key images from the abdominal ultrasound protocol.

3. Identify abdominal and pelvic organs based on their ultrasound appearances.

4. Describe the utility of ultrasound in evaluation of patients with right upper quadrant pain, lower abdominal pain, and pelvic pain.

5. Summarize the advantages and limitations of ultrasound as an imaging modality.

6. Explain advantages of transvaginal pelvic ultrasound compared to transabdominal pelvic ultrasound.

7. Review the anatomy of the upper and lower extremity venous systems distinguishing between deep and superficial structures

**Neuroradiology**

**Clinical Faculty**

Students are assigned to specific credentialed clinical faculty/preceptors at their core clinical site.

**Instructional Methods**

Scheduled rotation time (minimum 40 hours per week) will be used for supervised patient care, case presentations (onsite) and independent studying. You should review current guidelines on evidence based medicine posted on the ACP website and readings as directed by your supervising physician.

**Texts and Media**

Textbook:


Written by William Herring, MD, a seasoned radiology instructor and creator of an award-winning radiology teaching web site "Learning Radiology", efficiently presents just the radiology knowledge you need to know to get through clinical rotations and USMLEs. And, bonus online access via Student Consult where you will find the complete text of
4. Thoracic Radiology, the Requisites, 2nd edition, Theresa McLoud, MD
5. Fundamentals of Skeletal Radiology, 4th edition, Clyde Helms, MD

**Online Resources:**
- Radiology cases: http://www.mypacs.net/
- Auntminnie.com (http://www.auntminnie.com/index.asp?Sec=edu);
- Learning Radiology.com (http://www.learningradiology.com/);
- https://www.med-ed.virginia.edu/courses/rad/
- American College of Radiology (acr.org); Daily cases at: http://caseinpoint.acr.org/;
- https://www.usuhs.edu/rad/medpix
- Pediatric Cases of ACR Case in Point
  https://3s.acr.org/CIP/ShowArchiveCases.aspx?Status=Unknown&CName=Pediatric
- Web Based Modules on pediatric topics
  https://www.cchs.net/onlinelearning/cometvs10/pedrad/default.htm

**Rotation Format, Evaluation, Grading and Student Feedback**

Additional information is located in the Clinical Education Manual at:
http://www.westernu.edu/bin/ime/cem-2014.pdf

**Rotation Schedule**
Each site will provide students with a schedule on their first day of the rotation. If not provided please ask and have a clear understanding as to the expectations. These schedules are rarely available prior to the start the rotation.

It is solely your responsibility to read and understand all information provided to you by the site. Some sites have additional requirements above and beyond those set forth by the College of Osteopathic Medicine.

**Evaluation/Grading**
Grading for your clerkship will be calculated according to the Clinical Education Manual http://www.westernu.edu/bin/ime/cem-2014.pdf.

Please note, your attending/preceptor’s evaluation is based on, but not limited to the following:

- Communication skills regarding patients
- Care provided to assigned patients
- Attendance and participation at conferences, morning reports lectures and meetings
- Demonstration of library references on patients
- Completion and accuracy of paperwork on patients (Histories and Physicals, progress notes, treatment plans, presentations, hand-outs, etc.)
- Interaction with attendings, residents, students, medical staff, nursing and ancillary personnel
- General knowledge base and knowledge applied to specific patients
- Motivation in the learning process
- Overall performance, participation, enthusiasm to learn, and effort to improve
- Mid-rotation grades should be given by the intern/resident/attending. The final grade should be given/reviewed with the student on the last day of the rotation.

**General Policies**

**Policy on Disability Accommodations:** To obtain academic accommodations for this rotation, students with disabilities should contact the Center for Disability Issues and the Health Professions
and the system coordinator within ten days of the beginning of the system. Disability Services can be reached at 909.469.5380.


**Attendance Policy:** Refer to the Clinical Education Manual at http://www.westernu.edu/bin/ime/cem-2014.pdf.

**Academic Dishonesty:** Complete confidence in the honor and integrity of the health professions student and health care professional is essential. Such confidence depends entirely on the exemplary behavior of the individual health care provider in his or her relations with patients, faculty and colleagues. Strict honesty as a personal way of life should be nurtured during the period of education for professional service. The student shall conduct all aspects of his or her life with honor and integrity. This includes accountability to oneself and to relationships with fellow students, future colleagues, faculty, and patients who come under the student’s care or contribute to his or her training and growth, and members of the general public. This applies to personal conduct that reflects on the student’s honesty and integrity in both academic and non-academic settings, whether or not involving a University sponsored activity.

Upon accepting admission to the University, each student subscribes to and pledges complete observance to the Standards of Academic and Professional Conduct as outlined in the University Catalog for each academic program. A violation of these standards is an abuse of the trust placed in every student and could lead to suspension or dismissal.

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<th>WU INSTITUTIONAL OUTCOMES</th>
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<td>1</td>
<td>Critical Thinking</td>
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<tr>
<td>2</td>
<td>Breadth and Depth of Knowledge in the Discipline/Clinical Competence</td>
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<tr>
<td>3</td>
<td>Interpersonal Communication Skills</td>
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<td>4</td>
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<td>5</td>
<td>Ethical and Moral Decision Making Skills</td>
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<tr>
<td>6</td>
<td>Life Long Learning</td>
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<td>7</td>
<td>Evidence-Based Practice</td>
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<td>8</td>
<td>Humanistic Practice</td>
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<tr>
<td>COMP/OA CORE COMPETENCIES</td>
<td>Competency: Osteopathic Medical Students are part of an educational continuum that leads to residency and the curriculum provides the foundation for the following outcomes;</td>
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</tr>
<tr>
<td>1</td>
<td>Osteopathic Philosophy and Osteopathic Manipulative Medicine</td>
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<tr>
<td>2</td>
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<td>3</td>
<td>Patient Care</td>
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<td>Practice-Based Learning and Improvement</td>
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<td>7</td>
<td>Systems-based Practice</td>
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<thead>
<tr>
<th>COMPARISON OF OUTCOMES STANDARDS: WU AND COMP</th>
<th>WU</th>
<th>COMP</th>
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<tbody>
<tr>
<td>Critical Thinking</td>
<td>1</td>
<td>1, 2, 3, 6</td>
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