1. Contact Information

### Course Director

<table>
<thead>
<tr>
<th>Name</th>
<th>Field</th>
<th>Office</th>
<th>Phone</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joseph Stengel, DO</td>
<td>Radiology</td>
<td></td>
<td>360.533.0400</td>
<td><a href="mailto:jstengel@pnwu.edu">jstengel@pnwu.edu</a></td>
</tr>
</tbody>
</table>

### Support Staff

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
<th>Office</th>
<th>Phone</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>Louisa Beckstrand</td>
<td>Clerkship Coordinator</td>
<td>BHH 104</td>
<td>509.249.7843</td>
<td><a href="mailto:lbeckstrand@pnwu.edu">lbeckstrand@pnwu.edu</a></td>
</tr>
<tr>
<td>Amy Gaulke</td>
<td>Clerkship Coordinator</td>
<td>BHH 104</td>
<td>509.249.7753</td>
<td><a href="mailto:agaulke@pnwu.edu">agaulke@pnwu.edu</a></td>
</tr>
</tbody>
</table>

2. Course Description/Overview

The Radiology clerkship is scheduled with a preceptor who is an expert in the field. The course can be used to gain the foundation of knowledge required of osteopathic physicians who will be ordering diagnostic imaging as part of their practice or to give a broad overview of the practice of Radiology to third year or fourth year students considering Radiology as a career. This elective will introduce students to the radiology reading room, various imaging modalities, and basic image-guided diagnostic and therapeutic procedures. The student may be given the opportunity to participate in procedures as the preceptor determines his/her readiness. The curriculum for this rotation is based on the nationally recognized curriculum from the Alliance of Medical Student Educators in Radiology.

3. Course Purpose/Goals

The purpose of this 2-4 week experience is to provide the student with a broad exposure to diagnostic imaging and basic image guided interventions. The student should develop an understanding of the advantages and limitations of the key imaging modalities; the clinical basis for appropriate imaging utilization; how images are obtained; how image guided procedures are performed; how to provide informed advice to patients about imaging; how imaging is incorporated into medical problem solving; and the basics of medical imaging interpretation as applied to routine and emergency medical practice. Completion of this course should prepare the student for the COMLEX exams and provide a basic foundation of imaging knowledge for residency.

4. Course Learning Objectives (NBOME)

| Course Learning Objectives | Methods of Assessment | Learning Activities |

Revised: 4.11.16
**Osteopathic Practice and Principles**
Candidates must be able to demonstrate knowledge of osteopathic principles and practice, and to demonstrate and apply knowledge of somatic dysfunction diagnosis and Osteopathic Manipulative Treatment in the clinical setting.

**Patient Care**

1. **Diagnostic management skills**
   - Know how to order appropriate imaging tests
     - Utilize the ACR (American College of Radiology) Appropriateness Criteria™
     - Include patient variables into imaging selection
   - Understand the importance of providing appropriate information on the radiology request form (history, physical, risk and limiting factors) so radiology can perform appropriate modality selection, protocolling, interpretation and billing

2. **Information retrieval skills**
   - Know how to access images and view them
     - Understand the basics of a PACS workstation
     - Understand windows, levels, image linking, etc.
   - Know how to access imaging reports: preliminary and final
   - Perform effective, rapid clinical information search

3. **Visual interpretative skills**
   - Know basic radiological anatomy
   - Understand the factors that affect image appearance and quality
   - Understand the importance of using prior comparison studies

**Preceptor and Regional Assistant Dean Feedback, On the Fly Evaluations, PxDx, Case Presentations, Preceptor Evaluation, Regional Assistant Dean Review.**

**Clinical experiences, Didactics, Case Presentations, OPP Day, Skills Labs.**
d. Recognize normal and common or critical abnormal findings on basic radiographic studies including abdominal radiographs, chest radiographs, radiographs of the bones and joints, etc.

4. Interventional skills
   a. Understand the different types of interventional procedures performed by radiology and the effectiveness of those procedures
      i. Diagnostic procedures e.g. biopsies
      ii. Therapeutic procedures e.g. embolizations, TIPS
   b. Understand how to work up a patient for basic interventional procedures e.g. indications and contraindications, alternative treatments, consequences to no treatment.
   c. Assist in basic interventional procedures e.g. paracentesis with ultrasound guidance (commensurate with skill/readiness)

5. Information processing skills
   a. Synthesize history, physical exam and imaging findings to make appropriate differential diagnoses
   b. Correctly interpret radiology reports

6. Patient safety and radiation exposure
   a. Understand the risks of imaging including physical, financial and emotional
      i. Radiation risk (ionizing) to patients and operators and methods to reduce radiation exposure
      ii. Contrast material risks
      iii. MRI safety
      iv. Pregnant patients and imaging
      v. Interventional procure risks

*Revised: 4.11.16*
## Medical Knowledge

Demonstrate an understanding and application of the evolving osteopathic, biomedical, clinical, epidemiological, biomechanical, and cognate (e.g., epidemiological and social-behavioral) sciences to optimize patient care.

1. Demonstrate sufficient general medical knowledge and apply this knowledge to radiologic studies
   a. Disease processes
   b. Disease presentations
   c. Disease progression and prognosis
   d. Appropriate therapies

## Practice Based Learning and Improvement

1. Use of information technology and data resources
   a. Demonstrate awareness of key sources of data for performing evidence-based medicine
      i. Use established medical algorithms (Ottawa ankle rule, Ottawa knee rule, NEXUS criteria for cervical spine imaging)
      ii. Use National society guidelines for imaging (e.g. Neurology stroke protocol, back pain, first trimester bleeding)
   b. Use evidence based methods for selecting imaging modalities
      i. ACR Appropriateness Criteria®
   c. Effectively search for additional information
      i. Use validated sources such as Pubmed (i.e. ‘Go Beyond Google™’)
      ii. Know when additional information is needed and search spontaneously

2. Perform critical assessment of the literature
   a. Show an awareness of current literature on common problems
   b. Research presentation topics appropriately using peer reviewed literature
### SURG 707, RADIOLOGY ELECTIVE ROTATION SYLLABUS

| c. Appropriately interpret the results of scientific studies (eg. Validity of study) |  |
| d. Be aware of some of the limitations of scientific studies (eg. Power, sample size, control subjects) |  |

3. Application of learning
   a. Effectively apply newly learned information to appropriate clinical settings
      i. Develop new skills
      ii. Apply newly acquired knowledge and skills in the appropriate clinical setting
      iii. Be able to propose changes in the patient care plan based on the outcomes of imaging studies
      iv. Demonstrate improvement in existing skills and develop new skills

### Interpersonal and Communication Skills

1. Interactions with patients
   a. Interacts effectively with patients
      i. Be compassionate, friendly, professional
      ii. Be able to take an effective history
      iii. Can calm anxious patients
      iv. Be able to develop a potentially therapeutic relationship
      v. Be able to give appropriate information within their knowledge, ability and level of responsibility

2. Interactions with physicians
   a. With radiologists (staff and residents)
      i. Be respectful, but not inhibited from asking questions
      ii. Ask appropriate insightful questions that gain knowledge
      iii. Not be overly intrusive, be aware of time limitations

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*Preceptor and Regional Assistant Dean Feedback, On the Fly Evaluations, PxDx, Case Presentations, Preceptor Evaluation, Regional Assistant Dean Review.*

*Clinical experiences, Observe informed consent for imaging/interventional procedures, Case Presentations, OPP Day, Skills Labs, MyFolio entries.*

*Revised: 4.11.16*
### SURG 707, RADIOLOGY ELECTIVE ROTATION SYLLABUS

| iv. Help with information technology, patient management, communication |
| v. Understand the importance of the radiologist-clinician interaction |
| b. With clinicians |
| i. Can gather appropriate clinical information about patients/study requests |
| ii. Can communicate results effectively to clinicians if asked |

#### 3. Interactions with technologists/nurses

| a. Exhibit respectful interactions and treat them as a member of the team |
| b. Are aware of the knowledge and training of paramedical staff |

#### 4. Written communication skills

| a. Documents clinical data effectively when needed (e.g., electronic medical record) |
| b. Understands need for recording of urgent findings |
| c. Provides relevant clinical history on requisitions for medical imaging |

#### 5. Presentation skills

| a. Presents fluent, well-researched presentation |
| b. Shows understanding of topic |
| c. Conveys information succinctly and memorably to audience |

### Professionalism

| 1. Demonstrate appropriate skills |
| a. Maintains professional and medical competence by continuing to self-learn throughout career |
| b. Seeks help and support when identifies a knowledge gap |
| c. Continually gathers new scientific knowledge |

Preceptor and Regional Assistant Dean Feedback, On the Fly Evaluations, PxDx, Case Presentations, Preceptor Evaluation, Regional Assistant Dean Review.

Clinical experiences, Didactics, Case Presentations, OPP Day, Skills Labs, MyFolio entries.

Revised: 4.11.16
d. Strives to improve the quality of patient care by practicing at the highest level of quality

2. Demonstrates appropriate behaviors
   a. Meets professional responsibilities by working as a member of a team
   b. Demonstrates honesty with patients and all members of the health care team
   c. Respects patient confidentiality with all information transmitted during a patient encounter
   d. Maintains appropriate relationships with patients to prevent boundary transgression

3. Demonstrates social justice and service
   a. Works to improve access to care for those patients with limited resources
   b. Considers just distribution of finite sources when selecting imaging tests
   c. Understands issues around conflict of interest

Knowledge for Practice
1. Demonstrate radiological knowledge
   a. Understand common radiological modalities
      i. How they are used to generate adequate diagnostic images
      ii. What affects the image appearance on different modalities (tissue composition)
      iii. Common radiologic terminology (opacity, echogenicity)
      iv. Pros and cons of imaging modalities in different clinical situation
      v. ACR Appropriateness Criteria for Imaging© common conditions
   b. Radiological findings in common diseases on typical modalities
   c. Accuracy of different modalities in common conditions

Preceptor and Regional Assistant Dean Feedback, On the Fly Evaluations, PxDx, Case Presentations, Preceptor Evaluation, Regional Assistant Dean Review.

Clinical experiences, View Box (PACS) teaching, Didactics, Case Presentations, OPP Day, Skills Labs, MyFolio entries.

Revised: 4.11.16
# SURG 707, RADIOLOGY ELECTIVE ROTATION SYLLABUS

## Systems-Based Practice

1. Demonstrate awareness of the goal of cost effective imaging
   - a. Aware of common examination charges
   - b. Understands the basic concepts of costs and reimbursement
   - c. Understands the financial impact on patients and society of imaging
     i. Understands the importance of performing appropriate imaging
     ii. Appreciates potential future limitations to imaging availability

2. Understands the workflow patterns in radiology for effective patient management, study ordering etc

3. Demonstrates effective communication between radiology and clinicians
   - a. Appreciates the importance of the radiology-clinician interaction
   - b. Appreciates the importance of prioritizing studies based on study urgency
   - c. Understands the importance of prompt preliminary reports
   - d. Understands the process of dealing with discrepancies between preliminary and final reports

4. Understands the impact of medical radiation exposure on potential cancer risk for population as a whole
   - a. Demonstrates knowledge of current data regarding risk
   - b. Aware of need for reducing unnecessary imaging

## Preceptor and Regional Assistant Dean Feedback, On the Fly Evaluations, PxDx, Case Presentations, Preceptor Evaluation, Regional Assistant Dean Review.

## Clinical experiences, Didactics, Case Presentations, OPP Day, Skills Labs, MyFolio entries.

## 5. Course Schedule/Calendar

Please refer to the rotation schedule in E*Value.

*Revised: 4.11.16*
6. Course Format

The rotation block is scheduled from Monday of the first day through Sunday of the last day. It is the expectation that the student will be available to assist the preceptor or designee whenever he/she is working. This may include evening and weekend call time as assigned by the preceptor and may be up to 80 hours per week.

Didactics take place throughout your 3rd & 4th year and will be scheduled by the Regional Assistant Dean. Attendance is mandatory when rotating within the region. Exceptional circumstance involving clinical duties that require absence from didactics must be approved by the Regional Assistant Dean before didactics begin.

7. Course Logistics

Clinical rotations for PNWU are developed in a community training model. Community training involves placing students in a busy physician’s practice with learning objectives that direct the student’s focus. It is the student’s job to learn rather than the physician’s job to teach. Learning is “just in time”, taking advantage of educational opportunities that present and augmenting learning opportunities with reading or modules to complete the objectives. In this model, students are expected to develop lifelong learning patterns of accessing appropriate resources rather than being told what to do and when to do it (prescriptive learning). The required texts will provide information necessary for successfully studying in this rotation, but some students may prefer suggested texts or others. Preceptors may direct the student to their favorite texts or online resources.

Case Logs – PxDx

The Case Logs or “Must See Cases” recorded in PxDx are the course objectives for this rotation. These objectives will prepare the student with a wide breadth of understanding of the common and life threatening conditions seen in Radiology. Please see the appendix for the list of “must see” cases.

Logs of the “Must See” cases will be documented in E*Value on PxDx. Logs may be satisfied by seeing an imaging study with the findings or condition, observing or participating in a procedure, completing a reading assignment on the condition, or doing an online module. When participating in patient care, you may wish to briefly state information about a patient presentation, imaging modality and imaging findings for your reference. For example “26 yo female, RLQ pain, CT showing perforated appendicitis”. If a reading is completed or a module done, briefly comment in the notes section the text used or module completed. While each log must have at least one requirement for a passing grade, logging the number of encounters actually participated in will better reflect your rotation experience. The logs may be collated in the portfolio to showcase work for residency interviews. To verify logs completed, a summary report can be run in PxDx to see which requirements have been met.

Revised: 4.11.16
A number of good tutorials and image databases can be found online including:

- Albert Einstein radiology education site (www.learningradiology.com)
  - Albert Einstein Medical Center Radiology teaching resources and tutorials, cases aimed at medical students and radiology residents-in-training with a very good section for students

- AMSER Shared Resources – These include a 4000+ image dataset of commonly found conditions, lectures and other resources donated by members of the AMSER group of the Association of University Radiologists. http://www.dartmouth.edu/~amserimages/ login: amserid password: roentgen

This is a limited list of diagnoses and their respective imaging modalities that all students should see and be able to recognize classic examples of, regardless of their planned speciality. (Images that can be used for teaching this list are available at AMSER Shared resources.)

<table>
<thead>
<tr>
<th>Must See Cases</th>
<th>Details</th>
<th>Modalities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pneumothorax</td>
<td>Upright, supine, signs of tension</td>
<td>CXR, CT</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>Lobar, multifocal, viral</td>
<td>CXT, CT</td>
</tr>
<tr>
<td>Pneumomediastinum</td>
<td></td>
<td>CXR, CT</td>
</tr>
<tr>
<td>Pneumoperitoneum</td>
<td>Upright, supine</td>
<td>CXR, KUB, CT</td>
</tr>
<tr>
<td>Pleural effusion</td>
<td>Upright, supine</td>
<td>CXR, CT</td>
</tr>
<tr>
<td>Congestive heart failure</td>
<td>Cardiomegaly, Pulmonary venous hypertension, interstitial, alveolar edema</td>
<td>CXR</td>
</tr>
<tr>
<td>Aortic dissection</td>
<td>Type A and type B</td>
<td>CXR, CT</td>
</tr>
<tr>
<td>Aortic aneurysm</td>
<td>Ascending, AAA, leak, rupture</td>
<td>CXR, CT</td>
</tr>
<tr>
<td>Diaphragmatic rupture</td>
<td></td>
<td>KUB, CT</td>
</tr>
<tr>
<td>SBO</td>
<td>Upright, supine</td>
<td>KUB</td>
</tr>
<tr>
<td>Cecal and sigmoid volvulus</td>
<td></td>
<td>KUB, enema</td>
</tr>
<tr>
<td>Distal large bowel obstruction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ascites</td>
<td>Free fluid, hemoperitoneum</td>
<td>US, CT</td>
</tr>
<tr>
<td>Misplaced lines/tubes</td>
<td>Feeding/NG tubes, central venous catheters, endotracheal tubes</td>
<td>CXR, KUB</td>
</tr>
<tr>
<td>Child abuse</td>
<td>Metaphyseal and rib fractures, bilateral subdural (inc. isodense)</td>
<td>CXR, extremity films, CT</td>
</tr>
<tr>
<td>Stroke</td>
<td>Edema, hemorrhage, mass effect</td>
<td>CT</td>
</tr>
</tbody>
</table>
### Teaching Methods

The following are suggested teaching resources and methods for a student elective in Radiology. These are collated from multiple programs with different resources, program formats and needs, and not all could be applied in any one program.

#### Group based conferences

- Didactic lectures (i.e., imaging of abdominal pain)
- "Hot seat" case conference (unknown cases)
- Case conferences with review of cases (i.e., tumor board)

#### Student presentations

- Case based or imaging topic presentation to department or to other students
- Development of case into published case report

#### One-on-one teaching

- Viewbox observation, especially morning readout (if applicable to department)
- Observation of patient experiences (i.e., patient tracing)
- Longitudinal shadowing of specific technologist, resident or preceptor
- Taking evening call with resident or preceptor if applicable

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**Revised: 4.11.16**

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<table>
<thead>
<tr>
<th>Medical Condition</th>
<th>Imaging Findings</th>
<th>Imaging Modality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intracranial traumatic hemorrhage</td>
<td>Epidural, subdural, subarachnoid, intraparenchymal</td>
<td>CT</td>
</tr>
<tr>
<td>Increased intracranial pressure</td>
<td>Midlineshift and cerebral herniation, hydrocephalus</td>
<td>CT</td>
</tr>
<tr>
<td>Space occupying lesions</td>
<td>Mass effect, edema, +/- contrast</td>
<td>CT, MR</td>
</tr>
<tr>
<td>Cervical spine injury</td>
<td>Abnormalities of spinal-laminar lines/alignment of the c-spine e.g. posterior ligamentous injury</td>
<td>Plain films, CT</td>
</tr>
<tr>
<td>Fracture with extension into joint</td>
<td>Knees, ankles, wrist, elbow</td>
<td>Plain films</td>
</tr>
<tr>
<td>Elbow joint effusion</td>
<td>Radial head fracture, distal humeral fracture</td>
<td>Plain films, child and adult</td>
</tr>
<tr>
<td>Shoulder dislocation</td>
<td>Anterior and posterior</td>
<td>Plain films</td>
</tr>
<tr>
<td>buckle fractures</td>
<td>Radius, child</td>
<td>Plain films</td>
</tr>
<tr>
<td>Scaphoid fracture</td>
<td></td>
<td>Plain films</td>
</tr>
<tr>
<td>Hip fracture</td>
<td>Subcapital, intertrochanteric, subtle</td>
<td>Plain films</td>
</tr>
</tbody>
</table>
8. Learning Assessments

### Formative Assessments

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Pass/Fail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regional Assistant Dean Reviews</td>
<td>Pass/Fail</td>
</tr>
<tr>
<td>Review of PxDx to ensure 100% completion</td>
<td></td>
</tr>
<tr>
<td>On-the-Fly Evaluation of Recorded Presentation – Regional Assistant Dean</td>
<td>Pass/Fail</td>
</tr>
<tr>
<td>Mid-rotation Preceptor Review (if applicable)</td>
<td>Not graded</td>
</tr>
<tr>
<td>Preceptor Evaluation of Student Performance in Core Competencies</td>
<td>Pass/Fail</td>
</tr>
</tbody>
</table>

### Summative Assessments

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Pass/Fail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preceptor Evaluation of Student Performance</td>
<td>Pass/Fail</td>
</tr>
<tr>
<td>Attendance (any unexcused absence constitutes a fail)</td>
<td>Pass/Fail</td>
</tr>
</tbody>
</table>

Grades for this course are Pass/Fail. All assessments must have a grade of “Pass” to pass a rotation. Any of the summative assessments with a “Fail” will require remediation of the rotation. Students who have not completed the rotation satisfactorily will be referred to Student Progress Committee for determination of remediation.

9. Exam Policy

No end of service examinations are given by PNWU during electives. Students should be preparing for COMLEX 2 CE & PE during their rotations. Many items on the case list for this rotation are also required elements of core clinical rotations and may appear on COMATs for those rotations.

10. Course Textbooks & Supplies

### Required Textbooks

<table>
<thead>
<tr>
<th>Title/ISBN</th>
<th>Author/Publisher/Edition</th>
</tr>
</thead>
<tbody>
<tr>
<td>None. Preceptor may recommend reading materials.</td>
<td></td>
</tr>
</tbody>
</table>

Revised: 4.11.16
Suggested Additional Resources

<table>
<thead>
<tr>
<th>Title/ISBN</th>
<th>Author/Publisher/Edition</th>
</tr>
</thead>
</table>

11. Student Roles and Responsibilities

Link to Current Student Catalog:
http://www.pnwu.edu/files/8714/3440/1005/2015-16_StudentCatalog.pdf

Link to Current Student Handbook:

a. Student Professionalism
   Professional behavior is expected at all times during this course. It is important that students learn to discuss topics of a sensitive nature in a caring and professional manner. Use of cell phones or texting during class is prohibited. For further clarification of student professionalism expectations, see p. 23 of the Student Catalog.

b. Honor Code
   The highest standards of academic honesty are required of all PNWU-COM students at all times. It is expected that no PNWU student will be dishonest in any way, or give the impression of dishonest behavior, nor will PNWU students tolerate dishonesty in others. Disciplinary action may occur as a result of failure to comply with these standards.

c. Academic Support
   Students in need of peer tutorial assistance are directed to contact Dr. Rica Amity, PhD., Learning Skills Specialist (ramaity@pnwu.edu). Though the Office for Academic Affairs strives to accommodate all tutorial assistance requests, priority will be given to students who demonstrate need based on their academic performance.

Revised: 4.11.16
The most successful students will practice the following behaviors:

**First day**
- Share contact information with the preceptor and learn what expectations of communication are.
- Ensure the preceptor has a copy of the PNWU syllabus for the course.
- Ask about the regular schedule, on call expectations and notify the preceptor if there are any excused absence days (i.e. COMLEX exams).
- Find out where personal items may be placed and documentation can be done, as well as policies regarding student access to and documentation on medical records.
- Greet and be courteous to clinic staff. Be careful of joking, off color humor or comments that could be misunderstood.
- Clarify expectations for the use of electronic aids.
- Ask if he/she should pre-round on hospital inpatients and clarify time and place for meeting daily.

**Daily**
- Be on time and prepared with what is needed.
- Greet and be courteous to clinic staff. Be careful of joking, off color humor or comments that could be misunderstood. Review patients for the next day for topics to read on.
- Read or do modules on patients seen that day for reinforcement of learning.
- Log every day. Two to three cases logged every day will help get through the "must see" cases without last minute cramming.
- Be prepared to assist in any opportunities that present.
- Be enthusiastic. No matter what his/her area of interest is, there are things the student will be exposed to that may not be seen again in his/her career.

**Weekly**
- Participate in didactics.
- Be prepared with interesting cases he/she has seen throughout the week - help teach classmates.
- Return to his/her clinical responsibilities before/after didactics (this should not be a full day off!).
- Review progress on logs and the growth of his/her understanding.

**Mid-Rotation (Optional on Electives but Encouraged)**
• The student should request feedback on how he/she is doing. It is the student’s responsibility to document the feedback on the mid-rotation feedback form and upload to MyFolio for future reference. Students should make adjustments to performance based on that feedback.

End of Rotation

• The student should ask for a final review of his/her performance during the last week of the rotation. Students should be getting feedback from the preceptor informally daily on performance and areas needing improvement. Supplying the preceptor with a paper copy of the evaluation will help secure completion of the evaluation while the student’s performance is fresh in the preceptor’s mind. If the student has felt especially positive about the interactions, the student should consider asking the preceptor if he/she would be willing to write a strong letter of recommendation.