

**JEFFERSON COLLEGE**

**COURSE SYLLABUS**

**RAD260**

**MRI Registry Review**

3 Credit Hours

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Curriculum Committee Approval Date: 2019

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## **RAD260 MRI Registry Review**

### **I. CATALOGUE DESCRIPTION**

- A. Prerequisites: Registered Radiologic Technologist through the American Registry of Radiologic Technologists (ARRT) or second year Radiologic Technology student in their final semester of an accredited program.
- B. Credit hour award: 3
- C. Description: This course is designed to provide an ARRT Registered Radiologic Technologist the structured educational requirements needed to be eligible to take their ARRT post-secondary Magnetic Resonance Imaging (MRI) registry. Each of the four content areas for the ARRT exam will be covered, including: patient care, safety, image production, and procedures.(S)
- D. Curricular alignment
  - 1. Elective course only. Does not apply toward any certificate/degree requirement.

### **II. EXPECTED LEARNING OUTCOMES/CORRESPONDING ASSESSMENT MEASURES**

<b>Expected Learning Outcomes</b>	<b>Assessment Measures</b>
Understand Legal and Ethical Principles, including the ARRT Standard of Ethics as well as patient rights and patient education.	Written Assignments Class Discussion Written Examinations
Identify the concepts and terminology associated with infection control, cleaning of equipment and disposal of contaminated materials.	Class Discussion/Activity Written Examinations Written Assignments
Understand MRI equipment, environment, patient safety and biological considerations as well as the physical principles of image formation including instrumentation and MRI systems.	Class Discussion/Activity Written Examinations Written Assignments
Identify tissue characteristics and spatial localization.	Class Discussion/Activity Written Examinations Written Assignments
Understand MRI quality control, equipment handling and inspections along with image quality, image contrast, data acquisition, processing and data manipulation (post processing).	Class Discussion/Activity Written Examinations Written Assignments

Know exam procedures of the head, neck, spine, thorax, abdomen, pelvis, and MSK as well as special procedures such as MRA/MRV, functional tests, and dynamic imaging.	Class Discussion/Activity Written Examinations Written Assignments
Understand the patient set-up process, data input, coil selection, orientation, landmarks, gating and triggering.	Class Discussion/Activity Written Examinations Written Assignments
Identify anatomy and pathology on various imaging planes.	Class Discussion/Activity Written Examinations Written Assignments

### III. OUTLINE OF TOPICS

#### A. Patient interactions and Management

1. Legal and ethical principles
  - i. Legal issues
  - ii. Patient's rights
  - iii. ARRT Standards of Ethics
2. Infection Control
  - i. Terminology and basic concepts
  - ii. Cycle of infection
  - iii. CDC Standard Precautions
3. Interpersonal Communications
  - i. Patient education
  - ii. Medical terminology
4. Patient Assessment, Monitoring and Management
  - i. Routine monitoring
  - ii. Emergency response
  - iii. Medical equipment safety
  - iv. Implantable devices
5. Pharmacology
  - i. Contrast types
  - ii. Contraindications
  - iii. Lab values
  - iv. Dose calculation

#### B. MRI Screening and Safety

1. Screening and education
  - i. Biomedical implants
  - ii. Ferrous foreign bodies
  - iii. Medical conditions
  - iv. Topical or externally applied items
  - v. Level 1 and level 2 MRI personnel
2. Equipment Safety
  - i. Placement of conductors
  - ii. Cryogen safety
  - iii. Ancillary equipment

- iv. Emergency procedures
- 3. Environment
  - i. Climate control
  - ii. Designated safety zones
  - iii. Gauss lines
  - iv. Magnetic shielding
  - v. RF shielding
- 4. Biological Considerations
  - i. RF field
  - ii. Static and gradient magnetic fields
  - iii. Acoustic noise
- C. Image Production- Physical Principles of Image Formation
  - 1. Instrumentation
    - i. Electromagnetism
    - ii. Radiofrequency systems
    - iii. Gradient system
  - 2. Fundamentals
    - i. Nuclear magnetism
    - ii. Tissue characteristics
    - iii. Spatial localizations
  - 3. Artifacts
    - i. Cause and appearance of artifacts
    - ii. Compensation for artifacts
  - 4. Quality Control
    - i. Slice thickness
    - ii. Spatial and contrast resolution
    - iii. Signal to noise
    - iv. Center frequency
    - v. Transmit gain
    - vi. Geometric accuracy
    - vii. Equipment handling and inspection
  - 5. Sequence Parameters and Options
    - i. Imaging parameters
    - ii. Imaging options
  - 6. Data Acquisition and Processing
    - i. Spin echo
    - ii. Inversion recovery
    - iii. Gradient recall echo
    - iv. Echo planar imaging
  - 7. Data manipulation
    - i. K-space mapping and filling
    - ii. Fast fourier transformation
    - iii. Post processing
  - 8. Special Procedures
    - i. MRA/MRV
    - ii. Functional techniques

- iii. Dynamic imaging
- iv. Contrast bolus detection

#### D. Procedures

1. Anatomy and Physiology
  - i. Imaging planes
  - ii. Pathological considerations
  - iii. Protocol considerations
  - iv. Patient considerations
2. Patient set-up
  - i. Coil selection and position
  - ii. Patient orientation
  - iii. Landmarking
  - iv. Physiologic gating and triggering
3. Head and Neck
  - i. Brain
  - ii. Head trauma
  - iii. Brain for stroke
  - iv. Brain for MS
  - v. Brain for seizure
  - vi. Brain for CSF flow
  - vii. Pediatric brain
  - viii. IAC
  - ix. Pituitary
  - x. Orbit
  - xi. Soft tissue neck
  - xii. Angiography
  - xiii. Spectroscopy
4. Spine
  - i. Cervical
  - ii. Thoracic
  - iii. Lumbar
  - iv. Sacrum/coccyx
  - v. Brachial plexus
5. Body
  - i. Thorax
  - ii. Abdomen
  - iii. Pelvis
6. MSK
  - i. TMJ
  - ii. Shoulder
  - iii. Elbow
  - iv. Wrist/hand/fingers/thumb
  - v. Hip
  - vi. Ankle
  - vii. Knee
  - viii. Foot

- ix. Long bones
- x. Arthrography
- xi. Angiography
- xii. SI joints
- xiii. SC joints
- xiv. Sternum
- xv. Bony pelvis

#### IV. METHOD(S) OF INSTRUCTION

This course is taught using a variety of instructional methods, which include but are not limited to interactive lectures, computer presentations, group activities and exercises, videos, supplemental handouts and student presentations. Students are expected to be *ACTIVE* participants in the learning process. Students are expected to read the assigned readings prior to scheduled class meetings and come to class prepared to actively participate in all activities

#### V. REQUIRED TEXTBOOK(S)

- a. Bushong, S., & Clarke, G. (2015). *Magnetic Resonance Imaging: Physical and Biological Principles* (Current Edition ). St. Louis: Elsevier Mosby.

#### VI. REQUIRED MATERIALS

- A. A computer with internet access and basic software to include Word and PowerPoint (available through Jefferson College labs)
- B. Course homepage available through Blackboard

#### VII. SUPPLEMENTAL REFERENCES

- A. Supplemental Textbooks
  - a. Peterson, Connie (n.d.) *Sectional Anatomy for Imaging Professionals* (Current Edition).Elsevier.
- B. Class Handouts
- C. Library Resources
  - i. Textbooks
  - ii. Periodicals
  - iii. Films On Demand Videos
- D. Internet Resources
  - iv. On-line references
  - v. Textbook companion website

#### VIII. METHOD(S) OF EVALUATION

**GRADES** –Grades will be based on the percentage of total points earned out of total points possible for this semester. The assignments will vary in the number of possible points based upon amount of work involved and complexity of material. The student should be aware that proofreading and revision are extremely important when preparing homework. All writing assignments submitted for grading should be final drafts.

**EXAMS** -All exams with scores less than 75% must be retaken until a score of 75% or

above is achieved to complete course requirements. The student will be allowed to retake an exam until content mastery is achieved.

Grading Scale: (Jefferson College Radiologic Technology Program's)

A= 100-92%

B= 91.9-86%

C= 85.9-80%

D= 79.9-70%

F= 69.9 and below

I= Incomplete

W= Excused withdrawal from course

#### IX. ADA AA STATEMENT

Any student requiring special accommodations should inform the instructor and the Coordinator of Disability Support Services (TC101; phone 636-481-3169).

#### X. ACADEMIC HONESTY STATEMENT

All students are responsible for complying with campus policies as stated in the Student Handbook (see College website, <http://www.jeffco.edu>).

#### XI. ATTENDANCE STATEMENT

Regular and punctual attendance is expected of all students. Any one of these four options may result in the student being removed from the class and an administrative withdrawal being processed: (1) Student fails to begin class; (2) Student ceases participation for at least two consecutive weeks; (3) Student misses 15 percent or more of the coursework; and/or (4) Student misses 15 percent or more of the course as defined by the instructor. Students earn their financial aid by regularly attending and actively participating in their coursework. If a student does not actively participate, he/she may have to return financial aid funds. Consult the College Catalog or a Student Financial Services representative for more details.

#### XII. OUTSIDE OF CLASS ACADEMICALLY RELATED ACTIVITIES

The U.S. Department of Education mandates that students be made aware of expectations regarding coursework to be completed outside the classroom. Students are expected to spend substantial time outside of class meetings engaging in academically related activities such as reading, studying, and completing assignments. Specifically, time spent on academically related activities outside of class combined with time spent in class meetings is expected to be a minimum of 37.5 hours over the duration of the term for each credit hour.