CASPER COLLEGE COURSE SYLLABUS

RDTK 2920 H1
MRI Procedures II

Semester/Year: SP 2016

Lecture Hours: 3  Lab Hours: 0  Credit Hours: 3

Class Time: On-line, listed Saturday  Days, 2-7, 3-5, 4-16  Room: TBA

Instructor’s Name: Misty Dibble

Instructor's Contact Information:  Office Phone:  Cell Phone: 259-6245  Email: email instructor through moodle

Office Hours: On-line via e-mail through Moodle

Course Description:
This content provides the student with imaging techniques related to the musculoskeletal system, upper and lower extremities and vascular systems. The course will also present detailed content covering MRI pediatric procedures and specialized MR imaging exams to include: Magnetic resonance angiography, MR arthrography, and fMRI. The content covers specific application, coils that are available and their use, considerations in the scan sequences, specific choices in the protocols (e.g., slice thickness, phase direction and flow compensation), and positioning criteria. Anatomical structures and the plane that best demonstrates anatomy are discussed as well as signal characteristics of normal and abnormal structures. Content outlines the critical criteria relevant to acquiring high-quality images of various anatomical regions. Due to different considerations for the various regions in the body, imaging protocols vary. The student will study the variations in imaging parameters for specific body regions and the resultant effect on signal characteristics and the anatomy represented. Evaluation criteria for determining the quality of images provides MR technologists with a better understanding of what constitutes a high-quality image. In a competency-based educational system, this content is completed prior to competency examinations. Pathologies associated with the areas discussed in this course will be reviewed.

Statement of Prerequisites: RDTK 1950 MRI Procedures I

Goal:
The student technologist should recognize the need for additional sequences and changes in protocols based upon recognizing pathological changes. In addition, a technologist must be aware of indications that show a contrast agent is required. The knowledge of disease processes and their signal characteristics on various imaging sequences is essential to ensure the best practices in patient care and quality imaging.

1. State pathologies that commonly require an MR study.
2. Display understanding of the signal characteristics displayed by abnormal tissues during various pulse sequences and imaging modes in illustrating pathological processes.
3. Recognize changes in anatomical sizes and shapes of structures that can indicate pathology.
4. Describe basic pathological processes demonstrated by MR.
5. Identify the nature and courses of the pathologies listed in the course outline.
6. Describe the effect of contrast agents on visualizing pathology.

Outcomes:

1. State the coils available for MR and their specific application.
2. Describe considerations in designing an imaging protocol and state the application of protocols in specific situations.
3. Demonstrate proper patient screening.
4. Demonstrate knowledge of scanning menus, archival procedures and display functions.
5. Demonstrate proper windowing levels and widths.
7. Demonstrate how to prepare contrast materials and use MR injectors.
8. State positioning criteria for different areas of the body.
9. State advantages and disadvantages of axial, sagittal, coronal and oblique images (i.e., what structures are best demonstrated).
10. Describe common pulse sequences used to evaluate the different areas of the body.
11. State tissue signal characteristics of anatomical structures with and without contrast.
12. Explain the use of contrast media in evaluating pathology.
13. Describe common artifacts that occur during imaging.
14. Describe the differences between adult and pediatric pulse sequences in MR.
15. Describe the differences in tissue signal characteristics between adult and pediatric examinations.
16. Describe the criteria for imaging windows for different areas of the body.
17. Describe the MR characteristics of blood as seen on arterial and venous magnetic resonance angiography (MRA).
18. Identify how field strength affects the ability to visualize select pathology.
19. Describe the MR tissue characteristics of select pathological processes.
20. Discuss saturation pulses, which help to identify arteries and veins.
21. Evaluate images for appropriate positioning, anatomy, pulse sequences and overall quality.
22. Identify the common indications and common pathology for the exams covered.
23. Demonstrate effective communication skills with patients, their family members and staff.
25. Explain the principles of MR spectroscopy.
27. Discuss the hardware requirements for MR spectroscopy.
28. Describe and discuss the various imaging planes and pulse sequence parameters that maximize the diagnostic value of an MR scan of the central nervous system including the brain and spine.
29. Describe the normal MR tissue characteristics of the soft tissue structures of the head and face, orbit, nasopharynx, oropharynx, neck and spine.
30. Describe the effects of blood flow characteristics on image quality, including laminar turbulent, vortex and stationary or stagnant flow.
31. Identify common pathology of the soft tissue structures of the head and face, orbit, nasopharynx, oropharynx, neck and spine on MR images.
32. Identify common vascular lesions on MRA images.

**Methodology:** Lecture, hands on learning, case study

**Evaluation Criteria:** Exams, quizzes, case study presentations

**Grade Scale:**
- A = 92-100
- B = 83- 91
- C = 75- 82
- F = 0- 74

**Required Text, Readings, and Materials:**

3. CT and MRI Pathology; A Pocket Atlas, Michael Grey
4. Lippincott’s MRI Review, Wheeler

**Class Policies:**

**Student Rights and Responsibilities:** Please refer to the Casper College Student Conduct and Judicial Code for information concerning your rights and responsibilities as a Casper College Student.

**Chain of Command:** If you have any problems with this class, you should first contact the instructor to attempt to solve the problem. If you are not satisfied with the solution offered by the instructor, you should then take the matter through the appropriate chain of command starting with the Department Head/Program Director, the Dean, and lastly the Interim Vice President for Academic Affairs.
Academic Dishonesty - Cheating & Plagiarism: Casper College demands intellectual honesty. Proven plagiarism or any form of dishonesty associated with the academic process can result in the offender failing the course in which the offense was committed or expulsion from school. See the Casper College Student Code of Conduct.

ADA Accommodations Policy: If you need academic accommodations because of a disability, please inform me as soon as possible. See me privately after class, or during my office hours. To request academic accommodations, students must first consult with the college’s Disability Services Counselor located in the Gateway Building, Room 344, (307) 268-2557, bheuer@caspercollege.edu. The Disability Services Counselor is responsible for reviewing documentation provided by students requesting accommodations, determining eligibility for accommodations, and helping students request and use appropriate accommodations.

Calendar or schedule indicating course content:

Each area will contain the following content:
1. Anatomy and Physiology: Imaging planes, pathological considerations, protocol considerations.
2. Contrast: Type of agent, contraindications, dose calculations, administration route, effects on image.
3. Patient Positioning: Coil selection, patient orientation, landmarking, physiological gating and triggering, calibration scans

Topic 1
January 19-January 26th
Quiz Due: Jan 26th
Upper Limb: Imaging, Anatomy and Pathology
Includes: Shoulder, Humerus, Elbow, Forearm, Wrist, Hand
1. Handbook of MRI Technique, Chapter 13
2. CT and MRI Pathology: A Pocket Atlas, Pages 214-220
3. Handbook of MRI Scanning, Ch. 3

Topic 2
January 31st - Feb 13th
Class Feb 7th- Go over Upper extremity and Lower extremity
Quiz Due: Feb. 13th
Lower Limb: Imaging, Anatomy, and Pathology

Includes: Hip, Femur, Knee, Tibia, Fibula, Ankle, Foot, and Vascular Imaging

1. *Handbook of MRI Technique*. Chapter 14

2. *CT and MRI Pathology: A Pocket Atlas*. Pages 222-244

3. *Handbook of MRI Scanning*. Ch. 4

**Topic 3**

Feb 7th: Required class time.
Go over Upper and Lower Extremity

**Topic 4**

February 14- March 1

Specialized Imaging Techniques:

1. *Handbook of MRI Technique*. Instructor Guided

2. *MRI in Practice*. Ch. 8, 12 Answer chapter questions included in assignment section.

*Date Due: 3/1/2016.*

*Due date Ch. 12: 3/1/16*

Section to include:

MRA: Magnetic Resonance Angiography,
Magnetic Resonance Arthrography,
fMRI

**Topic 5**

March 1st-8th

Pediatric Imaging

*Handbook of MRI Technique*. Chapter 15

Topics Covered Include:

* Sedation and anesthesia
* Contrast media considerations
*Pediatric patient safety

*Common pediatric pathologies

*Technical considerations: brain, MRA, spine, musculoskeletal, cardiac

Students will submit a 2 page paper cover the special treatment of pediatric imaging. You can either choose to use information from Chapter 15 and or a case that you imaged yourself.

**Topic 6**

March 5th: Class at 9:00am

Case Study Presentations: Upper and Lower Limb

Each student will present two compete pathology case study presentations, one on an upper extremity and one on a lower extremity. See assignment link below for presentation criteria. Presented in class March 5th. I am specifically looking for knowledge on image weighting, what planes show what anatomy, why you do certain plains, what is the pathology weighting. I will give each of you a joint and a pathology, this will be a great opportunity for each of you to teach a pathology and anatomy. You can pick any pathology but you must select an upper extremity and a lower extremity.

50 Points ea. presentation

- Upper and Lower Extremity Case Presentations Assignment

Case Study, each student will give two presentations one on the upper extremity and one on the lower. This time you can pick the pathology and the body part to be covered.

**Topic 7**

March 8-22

1. Lippincotts MRI Review
Complete Review Questions on Pages 1-12

**Topic 8**

Spring Break 3/12-3/20
All modules are open this will be a great time to review.

**Topic 9**
March 22-29

1. Lippincott's MRI Review  
Complete questions pages 13-58

**Topic 10**
Review: please complete on own time.  
Quizzes open January 21- April 18

Watch module and complete quiz.  
3 attempts on the quiz as this are for your review.

**Topic 11**
Review: please complete on own time.  
Quizzes open January 21- April 18

Watch module and complete quiz.  
3 attempts on the quiz as this are for your review.

**Topic 12**
Review: please complete on own time.  
Quizzes open January 21- April 18

Watch module and complete quiz.  
3 attempts on the quiz as this are for your review.

**Topic 13**
Review: please complete on own time.
Quizzes open January 21 - April 18

Watch module and complete quiz.

3 attempts on the quiz as this are for your review.

**Topic 14**

**April 16th:** 9:00 am

**Required Class Day**

**Review**— This class will be used to go over any area you feel needs reviewed it will be based on your individual needs.

**Topic 15**

**April 18-May 6**

**ARRT Exam Review:**

Exam One: Contrast Media and Patient Safety  
Exam Two: Neuro., Body and Joint Imaging

**Areas Covered:**

**Patient Care:**

*Legal and Ethical Principles  
*MRI Screening and Safety  
*Patient Assessment, Monitoring and Management  
*Communication  
*Infection Control

**Imaging Procedures:**

*Anatomy and Physiology  
*Contrast  
*Patient Positioning

* Exam One: Contrast and Patient Safety Quiz
- Exam Two: Procedures Quiz
- Exam Three: Comprehensive Quiz