Course Syllabus

COURSE:	**RADR 2333.200 (3:3:0), Advanced Medical Imaging**
SEMESTER:	Spring 2014
CLASS TIMES:	TR 9:30 – 10:45
INSTRUCTOR:	Denny Barnes
OFFICE:	RC 512H
OFFICE HOURS:	MTWR 1 - 3; By appointment
OFFICE PHONE:	(806)716-4629
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"South Plains College improves each student's life."

GENERAL COURSE INFORMATION

COURSE DESCRIPTION

This course focuses on specialized imaging modalities. It includes concepts and theories of equipment operations and their integration for medical diagnosis.

COURSE OBJECTIVE

The student will be introduced to the basics of the available advanced imaging modalities used in the assessment of anatomy and diagnosis of disease processes. (F1,2,5,10,12;C5,6,7,8,15)

STUDENT LEARNING OUTCOMES

The student will:

1. Differentiate the specialized imaging modalities. (F1,10; C5,8,15,18,19)
2. Identify the advantages of the different advanced imaging modalities. (C5,8)
3. Explain the integration of the different advanced imaging modalities used in patient assessment. (F1,10;C5,6,7,15)
4. Identify and compare anatomy as imaged by different advanced imaging modalities. (F1,10; C5,8,15,18,19)

ACADEMIC INTEGRITY

It is the aim of the faculty of South Plains College to foster a spirit of complete honesty and a high standard of integrity. The attempt of any student to present as his or her own any work which he or she has not honestly performed is regarded by the faculty and administration as a most serious offense and renders the offender liable to serious consequences, possibly suspension.

Cheating - Dishonesty of any kind on examinations or on written assignments, illegal possession of examinations, the use of unauthorized notes during an examination, obtaining information during an examination from the textbook or from the examination paper of another student, assisting others to cheat, alteration of grade records, illegal entry or unauthorized presence in the office are examples of cheating. Complete honesty is required of the student in the presentation of any and all phases of coursework. This applies to quizzes of whatever length, as well as final examinations, to daily reports and to term papers.

Plagiarism - Offering the work of another as one's own, without proper acknowledgment, is plagiarism; therefore, any student who fails to give credit for quotations or essentially identical expression of material taken from books, encyclopedias, magazines and other reference works, or from themes, reports or other writings of a fellow student, is guilty of plagiarism.

FACEBOOK

The Radiologic Technology Program Facebook page is http://www.facebook.com/spcradiologictechnologyprogram. In addition to the South Plains College websites, this Facebook page will be used to keep students up-to-date on program activities, weather delays, and South Plains College announcements and will help with program recruitment. "Liking" the <insert program name here Radiologic Technology Program Facebook page is not mandatory, nor are personal Facebook accounts in order to access this page.

BLACKBOARD

Blackboard is an e-Education platform designed to enable educational innovations everywhere by connecting people and technology. This educational tool will be used in this course throughout the semester.

SCANS and FOUNDATION SKILLS

Refer also to Course Objectives. SCANS and Foundation Skills attached.

SPECIFIC COURSE INFORMATION

TEXT AND MATERIALS

Frank, Eugene., Merrill's Atlas of Radiographic Positioning and Procedures. 12th Edition, 2012. St. Louis, Missouri. The C.V. Mosby Co.

ATTENDANCE POLICY

Class and lab attendance is mandatory. During class, the student will have the opportunity to acquire the knowledge and skills required of a staff radiographer. During lab, the student will have the opportunity to practice those skills learned in class and achieve competency in radiographic imaging. These skills are not only important to the student's success in achieving the objectives of this course, but also insuring the effectiveness of the clinical and practicum courses that will enable the student to complete the clinical competencies required for graduation and ARRT certification board exam eligibility.

It is important that students arrive for class on time. **Tardiness** disrupts the instructor and the other students. Students that chronically arrive late for class will be counseled. Blatant disregard of this policy is an indication of rude, unprofessional behavior and a lack of interest in achieving the objectives of the course. If the student continues to arrive late for class, he or she may be dropped from the class regardless of his or her grade point average.

Policies regarding absences coincide with those established for South Plains College as outlined in the SPC General Catalog.

INSTRUCTIONAL METHODS

The student will receive course information through a series of lectures, PowerPoint presentations and textbook assignments.

ASSIGNMENT POLICY

Reading assignments, as well as lab assignments are the responsibility of the student. Reading assignments are provided in this syllabus. **The student must bring the applicable volume of Merrill's Atlas to every class and lab.**

GRADING RUBRIC

Grades in this course will be determined using the following criteria:

Assessment Tool	Assessment Criteria	Percentage Score	Grade
MAJOR EXAMS 50%	✓ Exceptional unit content knowledge & understanding	91 – 100	A
	✓ Good unit content knowledge & understanding	83 – 90	B
	✓ Average unit content knowledge & understanding	75 – 82	C
	✓ Unacceptable unit content knowledge & understanding	0 – 74	F
FINAL EXAM 50%	✓ Exceptional course content knowledge & understanding	91 – 100	A
	✓ Good course content knowledge & understanding	83 – 90	B
	✓ Average course content knowledge & understanding	75 – 82	C
	✓ Unacceptable unit content knowledge & understanding	0 – 74	F

Course Grade:	A	91 – 100
	B	83 – 90
	C	75 – 82
	F	0 – 74

A grade average of C (75) must be maintained in all RAD TECH classes. Failure to do so will result in the student being dropped from the Program.

STUDENT EVALUATION

Students' acquired knowledge will be evaluated by a multiple choice and matching major exam for each class unit.

GRADING POLICY

The course grade for RADR 2301 will consist of:

Major Exams:	50%
Final Exam:	50%
	100%

The following guidelines will be followed regarding **MAJOR EXAMS**:

1. The student will complete the exam at the scheduled time.
2. The student must complete the exam within the allotted class time of **1 hour and 15 minutes**.
3. There will be **NO** make-up exams or lab quizzes. **NO EXCEPTIONS**.
4. If a test must be missed, the weight of the final exam will be increased.
5. A student arriving late for an exam will not be allowed to take the exam if **any** student has completed the exam and left the room. This will also count as a tardy.
6. No cell phones or other electronic assistance, other than calculators, are allowed during exams.
7. Tests will be returned to the student for remediation. The student will use their textbook and lecture notes to correct missed questions. If the remediation response is correct, the student will receive one-fourth credit of the question's value (i.e. 0.25 for a question with an original value of 1) added to their test score. The student cannot consult with another student for corrections.
8. According to SPC policy, **student's grade will not be given over the phone or by email to avoid the risk of a breach of confidentiality.**

The following guidelines will be followed regarding the **FINAL EXAM**:

1. The final exam will be comprehensive.
2. The final exam must be completed within the allotted time.
3. A student arriving late for an exam will not be allowed to take the final exam if **any** student has completed the exam and left the room.
4. No cell phones or other electronic assistance, other than calculators, are allowed during exams.
5. The final exam will not be corrected for additional points. If a student is unable to take the final exam at the assigned time for any reason, the student may be given an incomplete for the course. After consulting the instructor, the student may be assigned a time to take the final exam and remove the incomplete. The final exam and course must be completed before the start of the spring semester.
6. According to SPC policy, **the student's grade will not be given over the phone or by email to avoid the risk of a breach of confidentiality.**

COMMUNICATION POLICY

Electronic communication between instructor and students in this course will utilize the South Plains College "My SPC" and email systems. Instructor will not initiate communication using private email accounts. Students are encouraged to check SPC email on a regular basis.

STUDENT CONDUCT

Students in this class are expected to abide by the standards of student conduct as defined in the SPC Student Guide and Radiologic Technology Program Student Handbook.

CELL PHONES

Cell phones are to be turned OFF during scheduled class/lab periods, unless prior approval has been given from the instructor. **THIS INCLUDES TEXT MESSAGING.** Cell phones are to be used outside the classroom only.

Students will be dismissed from class/lab and sent home if a phone rings/vibrates or if the student is discovered texting. The student will receive an absence for the class. The phone number to the front desk is (806)716-4622 for emergencies. In the event a student misses class or lab for violation of this Program policy may jeopardize the student's ability to meet the required objectives of the course.

ACCOMMODATIONS

DIVERSITY STATEMENT

In this class, the teacher will establish and support an environment that values and nurtures individual and group differences and encourages engagement and interaction. Understanding and respecting multiple experiences and perspectives will serve to challenge and stimulate all of us to learn about others, about the larger world and about ourselves. By promoting diversity and intellectual exchange, we will not only mirror society as it is, but also model society as it should and can be.

DISABILITIES STATEMENT

Students with disabilities, including but not limited to physical, psychiatric, or learning disabilities, who wish to request accommodations in this class should notify the Special Services Office early in the semester so that the appropriate arrangements may be made. In accordance with federal law, a student requesting accommodations must provide acceptable documentation of his/her disability to the Coordinator of Special Services. For more information, call or visit the Special Services Office in rooms 809 and 811, Reese Center Building 8, (806) 885-3048 ext. 4654.

COURSE OUTLINE

INSTRUCTIONAL UNIT: **SECTIONAL ANATOMY OVERVIEW**
The student will:

1. Identify the imaging modalities that produce cross-sectional images. (C15)
2. Identify the advantages of cross-sectional images. (C15)
3. Identify and differentiate between the major imaging planes used in producing cross-sectional images. (C15)
4. Identify the characteristics of computerized tomography cross-sectional images. (C15)
5. Identify the characteristics of magnetic resonance cross-sectional images. (F1,10;C5)
6. Identify major anatomical structures in examples of CT and MRI cross-sectional images. (F1,10;C5)

TEXTBOOK READING ASSIGNMENT: **Merrill's Atlas, Vol. III, Ch. 30**

INSTRUCTIONAL UNIT: **COMPUTED TOMOGRAPHY (CT)**
The student will:

1. Explain the fundamentals of computed tomography (CT). (F10;C5,6,15)
2. Differentiate between computed tomography and conventional radiography. (F10;C5,6,15)
3. Identify and differentiate between the different generations of computed tomography scanners. (F10;C5,6,15)
4. Identify the technical aspects of the CT image. (F10;C5,6,15)
5. Identify the components of the CT system. (F10;C5,6,15)
6. Identify and differentiate between the diagnostic applications of CT.
7. Explain the use of contrast material used in CT.
8. Identify and explain the factors affecting the CT image quality. (F10;C5,6,15)
9. Identify and differentiate between the special features of various CT systems. (F10;C5,6,15)
10. Identify and explain the factors affecting radiation dose received from a CT procedure.

11. Define the following terms associated with CT:

Algorithm	Dynamic scanning	Scan time
Aperture	Field of view	Slice
Artifact	Gantry	Spatial resolution
Attenuation	Generation	Spiral CT streak artifact
Axial	Gray-scale image	System noise
Computed tomography	Helical CT	Table increments
CT angiography	Hounsfield unit (HU)	Temporal resolution
CT number	Matrix	Threshold value
Contrast resolution	Noise	Voxel
Detector	Pixel	Window
Detector assembly	Quantum noise	
Direct coronal	Scan	

TEXTBOOK READING ASSIGNMENT: **Merrill's Atlas, Vol. III, Ch. 31**

INSTRUCTIONAL UNIT: **MAGNETIC RESONANCE IMAGING (MRI)**
The student will:

1. Explain the fundamentals of magnetic resonance imaging (MRI). (F10;C5,6,15)
2. Differentiate between magnetic resonance imaging and conventional radiography. (F10;C5,6,15)
3. Identify the physical principles of MRI signal production. (F10;C5,6,15)
4. Identify the significance of the MRI signal.
5. Identify the components of the MRI system. (F10;C5,6,15)
6. Discuss the safety of MRI.
7. Identify the imaging parameters of a MRI protocol. (F10;C5,6,15)
8. Discuss the positioning of the MRI patient.
9. Discuss the issues of patient monitoring during an MRI procedure.
10. Discuss the use of contrast media in MRI.
11. Identify the clinical applications of MRI.
12. Describe functional MRI. (F10;C5,6,15)
13. Define the following terms associated with MRI:

Coil	Paramagnetic	Slice
Contrast	Perfusion	Spin echo
Cryogenic	Permanent magnet	Spin-lattice relaxation
Diffusion	Precession	Spin-spin relaxation
Echo planar imaging	Proton density	Superconductive magnet
Frequency	Pulse sequence	Superparamagnetic
Gating	Radiofrequency (RF) pulse	T1
Gauss	Relaxation	T2
Gradient echo	Relaxation time	Tesla
Inversion recovery	Resistive magnet	Transverse plane
Magnetic resonance	Resonance	
Noise	Signal	

TEXTBOOK READING ASSIGNMENT: **Merrill's Atlas, Vol. III**, Chapter 32

INSTRUCTIONAL UNIT: **DIAGNOSTIC ULTRASOUND**
The student will:

1. Explain the principles of diagnostic ultrasound. (F10;C5,6,15)
2. Identify the properties of sound waves: acoustic impedance and velocity of sound.
3. Explain the process of transducer selection in diagnostic ultrasound. (F10;C5,6,15)
4. Differentiate between volume scanning and three-dimensional and four-dimensional ultrasound imaging.
5. Identify the characteristics of the sonographic image.
6. Identify the clinical applications of diagnostic ultrasonography.
7. Define the following terms associated with diagnostic ultrasound:

Acoustic impedance	Endorectal transducer	Real-time imaging
Acoustic window	Enedovaginal transducer	Reflection
Angle of incidence	Frequency	Refraction
Axial resolution	Gray scale	Sagittal plane
Continuous wave ultrasound	Heterogeneous	Scattering
Coronal image plane	Homogeneous	Sonar
Doppler effect	Hyperechoic	Sound wave
Doppler ultrasound	Hypoechoic	Transducer
Duplex imaging	Lateral resolution	Transverse
Echo	Oblique plane	Ultrasound
Echogenic	Pulse wave ultrasound	Velocity of sound

TEXTBOOK READING ASSIGNMENT: **Merrill's Atlas, Vol. III**, Chapter 33

INSTRUCTIONAL UNIT: **NUCLEAR MEDICINE**
The student will:

1. Explain the principles of nuclear medicine, including positron emission tomography (PET). (F10;C5,6,15)
2. Identify the important factors that distinguish PET from other nuclear imaging procedures and other radiologic procedures. (F10;C5,6,15)
3. Identify the radionuclides used for conventional nuclear medicine.
4. Identify the positron-emitting radionuclides used in PET.
5. Identify the physical principles of nuclear medicine. (F10;C5,6,15)
6. Discuss radiation safety in nuclear medicine.
7. Identify the components of the nuclear medicine system. (F10;C5,6,15)
8. Identify and differentiate the variety of diagnostic imaging methods of nuclear medicine. (F10;C5,6,15)
9. Identify the clinical applications of nuclear medicine.
10. Identify the clinical applications of positron emission tomography.
11. Define the following terms associated with nuclear medicine:

Alpha particle	Gamma camera	Radioactive
Attenuation coefficient	Gamma ray	Radioactivity
Becquerel	Ground state	Radioisotope
Beta particle	Half-life	Radionuclide
Cold spot	Light pipe	Radiopharmaceutical
Curie	Metastable	Radiotracer
Daughter	Nuclide	Region of interest
Deadtime	Parent	Scintillation detector
Decay	Photomultiplier tube	Scintillator
Detector	Positron	SPECT
Electron capture	Radiation	Washout

TEXTBOOK READING ASSIGNMENT: **Merrill's Atlas, Vol. III**, Chapter 34

FOUNDATION SKILLS

BASIC SKILLS–Reads, Writes, Performs Arithmetic and Mathematical Operations, Listens and Speaks
F-1 Reading–locates, understands, and interprets written information in prose and in documents such as manuals, graphs, and schedules.
F-2 Writing–communicates thoughts, ideas, information and messages in writing and creates documents such as letters, directions, manuals, reports, graphs, and flow charts.
F-3 Arithmetic–performs basic computations; uses basic numerical concepts such as whole numbers, etc.
F-4 Mathematics–approaches practical problems by choosing appropriately from a variety of mathematical techniques.
F-5 Listening–receives, attends to, interprets, and responds to verbal messages and other cues.
F-6 Speaking–organizes ideas and communicates orally.

THINKING SKILLS–Thinks Creatively, Makes Decisions, Solves Problems, Visualizes and Knows How to Learn and Reason
F-7 Creative Thinking–generates new ideas.
F-8 Decision-Making–specifies goals and constraints, generates alternatives, considers risks, evaluates and chooses best alternative.
F-9 Problem Solving–recognizes problems, devises and implements plan of action.
F-10 Seeing Things in the Mind's Eye–organizes and processes symbols, pictures, graphs, objects, and other information.
F-11 Knowing How to Learn–uses efficient learning techniques to acquire and apply new knowledge and skills.
F-12 Reasoning–discovers a rule or principle underlying the relationship between two or more objects and applies it when solving a problem.

PERSONAL QUALITIES–Displays Responsibility, Self-Esteem, Sociability, Self-Management, Integrity and Honesty
F-13 Responsibility–exerts a high level of effort and perseveres towards goal attainment.
F-14 Self-Esteem–believes in own self-worth and maintains a positive view of self.
F-15 Sociability–demonstrates understanding, friendliness, adaptability, empathy and politeness in group settings.
F-16 Self-Management–assesses self accurately, sets personal goals, monitors progress and exhibits self-control.
F-17 Integrity/Honesty–chooses ethical courses of action.

SCANS COMPETENCIES

C-1 **TIME** - Selects goal - relevant activities, ranks them, allocates time, prepares and follows schedules.
C-2 **MONEY** - Uses or prepares budgets, makes forecasts, keeps records and makes adjustments to meet objectives.
C-3 **MATERIALS AND FACILITIES** - Acquires, stores, allocates, and uses materials or space efficiently.
C-4 **HUMAN RESOURCES** - Assesses skills and distributes work accordingly, evaluates performances and provides feedback.

INFORMATION - Acquires and Uses Information
C-5 Acquires and evaluates information.
C-6 Organizes and maintains information.
C-7 Interprets and communicates information.
C-8 Uses computers to process information.

INTERPERSONAL–Works with Others
C-9 Participates as a member of a team and contributes to group effort.
C-10 Teaches others new skills.
C-11 Serves Clients/Customers–works to satisfy customer's expectations.
C-12 Exercises Leadership–communicates ideas to justify position, persuades and convinces others, responsibly challenges existing procedures and policies.
C-13 Negotiates-works toward agreements involving exchanges of resources; resolves divergent interests.

C-14 Works With Diversity–works well with men and women from diverse backgrounds.

SYSTEMS–Understands Complex Interrelationships

C-15 Understands Systems–knows how social, organizational, and technological systems work and operates effectively with them.

C-16 Monitors and Corrects Performance–distinguishes trends, predicts impacts on system operations, diagnoses systems performance and corrects malfunctions.

C-17 Improves or Designs Systems–suggests modifications to existing systems and develops new or alternative systems to improve performance.

TECHNOLOGY–Works with a Variety of Technologies

C-18 Selects Technology–chooses procedures, tools, or equipment, including computers and related technologies.

C-19 Applies Technology to Task–understands overall intent and proper procedures for setup and operation of equipment.

C-20 Maintains and Troubleshoots Equipment–prevents, identifies, or solves problems with equipment, including computers and other technologies.