COURSE SYLLABUS
RADT 1160 – Principles of Imaging II
FALL SEMESTER 2016

COURSE IDENTIFICATION

Course Number: RADT 1160
Course Name: Principles of Imaging II
Course Location: Room 743 Gillis Building
Course Length: 6 credit/5250 Minutes
Class Time/Days: 8AM – 4PM/Wednesday
Prerequisites: RADT 1070 – Principles of Imaging I
Co-requisites: None

INSTRUCTOR INFORMATION

Instructor: Tara W. Powell, M.B.A., R.T. (R)(M)(CT), RDMS
Office Location: Room 714/Gillis Building
Telephone: Office – 912.538.3152
Email: tpowell@southeasterntech.edu
Office Hours: Monday
Tutoring Hours: By appointment

REQUIRED TEXT:
Carlton & Adler. (2013). Principles of radiographic imaging: an art and a science. (5th). Delmar, Cengage Learning.

REQUIRED SUPPLIES & SOFTWARE: Notebook, pen, pencil, highlighter, internet access, Dosimeter

COURSE DESCRIPTION: Content is designed to impart an understanding of the components, principles and operation of digital imaging systems found in diagnostic radiology. Factors that impact image acquisition, display, archiving and retrieval are discussed. Guidelines for selecting exposure factors and evaluating images within a digital system assist students to bridge between film-based and digital imaging systems, with a knowledge base in radiographic, fluoroscopic, mobile and tomographic equipment requirements and design.

This content also provides a basic knowledge of quality control; principles of digital system quality assurance and maintenance are presented. Content is designed to provide entry-level radiography students with principles related to computed tomography (CT) imaging, and other imaging modalities (i.e., MRI, US, NM, Mammography) in terms of purpose, principles, equipment/material, and procedure.

MAJOR COURSE COMPETENCIES:
1. imaging equipment
2. digital image acquisition and display
3. basic principles of CT and other imaging modalities

PREREQUISITE(S): RADT 1070 – Principles of Imaging I

CO-REQUISITES: None

COURSE OUTLINE:

1. Imaging equipment			
	Description	**Learning Domain**	**Level of Learning**
1.1	Define potential difference, current, and resistance.	Cognitive	Knowledge
1.2	Describe electrical protective devices.	Cognitive	Comprehension
1.3	Identify the general components and functions of the	Cognitive	Knowledge

	tube and filament circuits.		
1.4	Identify the function of solid-state rectification.	Cognitive	Knowledge
1.5	Compare generators in terms of radiation produced and efficiency.	Cognitive	Synthesis
1.6	Discuss permanent installation of radiographic equipment in terms of purpose, components, types and applications.	Cognitive	Comprehension
1.7	Demonstrate operation of various types of permanently installed and mobile radiographic equipment.	Psychomotor	Guided Response
1.8	Discuss mobile units in terms of purpose, components, types and applications.	Cognitive	Comprehension
1.9	Describe functions of components of automatic exposure control (AEC) devices.	Cognitive	Comprehension
1.10	Demonstrate proper use of AEC devices.	Psychomotor	Guided Response
1.11	Identify the components of diagnostic x-ray tubes.	Cognitive	Knowledge
1.12	Explain protocols used to extend x-ray tube life.	Cognitive	Comprehension
1.13	Explain image-intensified and digital fluoroscopy.	Cognitive	Comprehension
1.14	Discuss gain and conversion factors as they relate to image intensification.	Cognitive	Comprehension
1.15	Describe the purpose, construction, and applications of video tubes and video recorders.	Cognitive	Comprehension
1.16	Discuss conventional and digital fluoroscopic image formation.	Cognitive	Comprehension
1.17	Identify fluoroscopic recording equipment.	Cognitive	Knowledge
1.18	Explain the purpose, principles and application of linear tomography.	Cognitive	Comprehension
1.19	Differentiate between quality improvement/management, quality assurance and quality control.	Cognitive	Analysis
1.20	List the benefits of a quality management program to the patient and to the department.	Cognitive	Knowledge
1.21	List elements of a quality management program and discuss how each is related to the quality management program.	Cognitive	Knowledge
1.22	Discuss the proper test equipment/procedures for evaluating the operation of an x-ray generator.	Cognitive	Comprehension
1.23	Evaluate the results of basic QC tests.	Cognitive	Evaluation

2. Digital image acquisition and display			
	Description	**Learning Domain**	**Level of Learning**
2.1	Define terminology associated with digital imaging systems.	Cognitive	Knowledge
2.2	Describe the various types of digital receptors.	Cognitive	Knowledge

2.3	Discuss the fundamentals of digital radiography, distinguishing between cassette-based systems and cassette-less systems.	Cognitive	Comprehension
2.4	Compare the image acquisition and extraction of cassette-based vs. cassette-less systems, including detector mechanism, initial image processing, histogram analysis, and automatic rescaling and exposure index determination.	Cognitive	Synthesis
2.5	Describe the evaluative criteria for digital radiography detectors.	Cognitive	Comprehension
2.6	Describe the response of digital detectors to exposure variations.	Cognitive	Comprehension
2.7	Compare the advantages and limits of each system.	Cognitive	Synthesis
2.8	Given the performance criteria for a digital radiography detector, evaluate the spatial resolution and dose effectiveness.	Cognitive	Application
2.9	Compare dynamic range to latitude of a screen/film receptor system to that of a digital radiography system.	Cognitive	Synthesis
2.10	Describe the histogram and the process or histogram analysis as it relates to automatic rescaling and determining an exposure indicator.	Cognitive	Comprehension
2.11	Describe or identify the exposure indices used by each photostimulable phosphor (PSP) - based system.	Cognitive	Comprehension
2.12	Describe the difference between dose area product (DAP) measured with a flat panel system vs. the exposure index for a PSP-based system.	Cognitive	Comprehension
2.13	Relate the receptor exposure indicator values to technical factors, system calibration, part/beam/plate alignment and patient exposure.	Cognitive	Application
2.14	Describe image acquisition precautions necessary for CR imaging.	Cognitive	Comprehension
2.15	Describe the response of PSP systems to background and scatter radiation.	Cognitive	Comprehension
2.16	Use appropriate means of scatter control.	Psychomotor	Mechanism
2.17	Avoid grid use errors associated with grid cut off and Moire' effect.	Psychomotor	Guided Response
2.18	Identify common limitations and technical problems encountered when using PSP systems.	Cognitive	Knowledge
2.19	Employ appropriate beam/part/receptor alignment to avoid histogram analysis errors.	Psychomotor	Mechanism
2.20	Describe the various image processing employed for digital images.	Cognitive	Comprehension
2.21	Correlate impact of image processing parameters to the image appearance.	Cognitive	Analysis
2.22	Associate effects of inappropriate processing on image clarity or conspicuity.	Cognitive	Application

2.23	Describe the fundamental physical principles of exposure for digital detectors.	Cognitive	Comprehension
2.24	Apply the fundamental principles to digital detectors.	Psychomotor	Mechanism
2.25	Describe the selection of technical factors and technical factor systems to assure appropriate receptor exposure levels for digital detectors.	Cognitive	Comprehension
2.26	Evaluate the effect of a given exposure change on histogram shape, data width and image appearance.	Cognitive	Evaluation
2.27	Describe the conditions that cause quantum mottle in a digital image.	Cognitive	Comprehension
2.28	Formulate a procedure or process to minimize histogram analysis and rescaling errors.	Cognitive	Synthesis
2.29	Describe the exposure precautions and limitations associated with PSP-based systems.	Cognitive	Comprehension
2.30	Avoid poor quality images by observing acquisition precautions.	Psychomotor	Mechanism
2.31	Examine the potential impact of digital radiographic systems on patient exposure and methods of practicing the as low as reasonably achievable (ALARA) concept with digital systems.	Cognitive	Analysis
2.32	Describe Picture Archival and Communications System (PACS) and its function.	Cognitive	Comprehension
2.33	Identify components of a PACS system.	Cognitive	Knowledge
2.34	Describe patient benefits gained through the use of teleradiology.	Cognitive	Comprehension
2.35	Identify modality types that may be incorporated into a PACS.	Cognitive	Knowledge
2.36	Define Accession Number.	Cognitive	Knowledge
2.37	Describe Worklist and correct usage.	Cognitive	Comprehension
2.38	Define digital imaging and communications in medicine (DICOM).	Cognitive	Knowledge
2.39	Describe how an image is associated with a radiology order to create a DICOM image.	Cognitive	Comprehension
2.40	Describe data flow for a DICOM image from an imaging modality to a PACS.	Cognitive	Comprehension
2.41	Describe HIPPA concerns with electronic information.	Cognitive	Comprehension
2.42	Identify common problems associated with retrieving/viewing images within a PACS.	Cognitive	Knowledge
2.43	Identify the primary uses of the Diagnostic Display Workstation and Clinical Display Workstation.	Cognitive	Knowledge

3. Basic principles of CT and other imaging modalities			
	Description	**Learning Domain**	**Level of Learning**
3.1	Describe the components of the CT imaging system.	Cognitive	Comprehension

3.2	Differentiate between conventional and spiral/helical CT scanning.	Cognitive	Analysis
3.3	Explain the functions of collimators in CT.	Cognitive	Comprehension
3.4	List the CT computer data processing steps.	Cognitive	Knowledge
3.5	Name the functions of the array processor used for image reconstruction.	Cognitive	Knowledge
3.6	Define the term "algorithm" and explain its impact on image scan factors and reconstruction.	Cognitive	Knowledge
3.7	Define the terms "raw data" and "image data."	Cognitive	Knowledge
3.8	Explain the difference between reconstructing and reformatting an image.	Cognitive	Comprehension
3.9	Describe the application of the following terms to CT: Pixel, Matrix, Voxel, Linear attenuation coefficient, CT/Hounsfield number, Partial volume averaging, Window width (ww) and window level (wl), Spatial resolution, Contrast resolution, Noise, Annotation, Region of interest (ROI), Standard vs. volumetric data acquisition.	Cognitive	Comprehension
3.10	Name the common controls found on CT operator consoles and describe how and why each is used.	Cognitive	Knowledge
3.11	Identify the types and appearance of artifacts most commonly affecting CT images.	Cognitive	Knowledge
3.12	Explain how artifacts can be reduced or eliminated.	Cognitive	Comprehension
3.13	List and describe current data storage techniques used in CT.	Cognitive	Knowledge
3.14	Name the radiation protection devices that can be used to reduce patient dose in CT and describe the correct application of each.	Cognitive	Knowledge
3.15	Discuss other imaging modalities (i.e., MRI, US, NM, Mammography) in terms of purpose, principles, equipment/material, and procedure.	Cognitive	Comprehension

GENERAL EDUCATION CORE COMPETENCIES: STC has identified the following general education core competencies that graduates will attain:

a) The ability to utilize standard written English.
b) The ability to solve practical mathematical problems.
c) The ability to read, analyze, and interpret information.

STUDENT REQUIREMENTS: Students are expected to complete all reading, tests, and daily assignments (handouts or online assignments) by the specified date. Assignments and handouts are to be completed before the student takes the test on the material assigned. If the student fails to complete any assigned material, a zero will be given for that test and for that assignment.

Students will be required to complete research on an assigned topic and present their topic to the class utilizing Power Point/video. The topic will be on current and developing technologies and issues within

Radiologic Technology. The Power Point presentation should last about 10 minutes and will be due at the end of the semester (See lesson plan schedule).

EXAMS*:* No study guides will be given and no grades will be dropped in this course. Classroom activities will be performed to assist in reviewing course materials and students are expected to perform any additional preparation for test on their own. Cellphones should not be used during a test for any reason and students found utilizing their cellphone during a test will automatically receive a zero on the test.

In addition, quizzes are subject to be given on any given day over any assigned material (i.e. reading, workbooks, etc.). Any quizzes missed due to student absence will not be made up. Quizzes will be averaged as a chapter test.

MAKEUP POLICY*: Students will be allowed to makeup one test. Any further missed test will result in a grade zero. All makeup exams will be given at the discretion of the instructor.*

Students are responsible for policies and procedures in student catalog/handbook and Departmental Policies and Procedures. [This could also include safety, academic dishonesty, etc.]

CELLPHONE POLICY: Cell phones are not to be utilized in the classroom or laboratory unless being used as an academic tool during classroom activities that are approved by the instructor. Students utilizing their cellphone for non-academic purposes during class or laboratory (texting, talking on or, emailing), will have 10 points taken off their next chapter test grade. In the event of an emergency, such as a sick family member or sick child, their calls should be directed to the front desk at 912-538-3117 where a message can be left.

ATTENDANCE GUIDELINES: Class attendance is a very important aspect of a student's success. Being absent from class prevents students from receiving the full benefit of a course and also interrupts the learning process. Southeastern Technical College considers both tardiness and leaving early as types of absenteeism. Responsibility for class attendance rests with the student. Regular and punctual attendance at all scheduled classes is required for student success. Students will be expected to complete all work required by the instructor as described in the individual course syllabus.

Instructors have the right to give unannounced quizzes/assignments. Students who miss an unannounced quiz or assignment will receive a grade of 0. Students who stop attending class, but do not formally withdraw, may receive a grade of F and face financial aid repercussions in upcoming semesters.

Instructors are responsible for determining whether missed work may be made up and the content and dates for makeup work is at the discretion of the instructor.

Students will not be withdrawn by an instructor for attendance; however, all instructors will keep records of graded assignments and student participation in course activities. The completion dates of these activities will be used to determine a student's last date of attendance in the event a student withdraws, stops attending, or receives an F in a course.

SPECIAL NEEDS: Students with disabilities who believe that they may need accommodations in this class based on the impact of a disability are encouraged to contact Helen Thomas, 912-538-3126, hthomas@southeasterntech.edu, to coordinate reasonable accommodations.

SPECIFIC ABSENCES: Provisions for Instructional Time missed because of documented absences due to jury duty, military duty, court duty, or required job training will be made at the discretion of the instructor.

PREGNANCY: Southeastern Technical College does not discriminate on the basis of pregnancy. However, we can offer accommodations to students who are pregnant that need special consideration to successfully complete the course. If you think you will need accommodations due to pregnancy, please advise me and make appropriate arrangements with Helen Thomas, (912) 538-3126, hthomas@southeasterntech.edu.

WITHDRAWAL PROCEDURE: Students wishing to officially withdraw from a course(s) or all courses after the drop/add period and prior to the 65% portion of the semester (date will be posted on the school calendar) must speak with a Career Counselor in Student Affairs and complete a Student Withdrawal Form. A grade of "W" is assigned when the student completes the withdrawal form from the course.

Students who are dropped from courses due to attendance (see your course syllabus for attendance policy) after drop/add until the 65% point of the semester will receive a "W" for the course. Abandoning a course(s) instead of following official withdrawal procedures may result in a grade of 'F' being assigned.

After the 65% portion of the semester, the student will receive a grade for the course. (Please note: A zero will be given for all missed assignments.)

There is no refund for partial reduction of hours. Withdrawals may affect students' eligibility for financial aid for the current semester and in the future, so a student must also speak with a representative of the Financial Aid Office to determine any financial penalties that may be accessed due to the withdrawal. All grades, including grades of 'W', will count in attempted hour calculations for the purpose of Financial Aid.

Remember - Informing your instructor that you will not return to his/her course does not satisfy the approved withdrawal procedure outlined above.

ADDITIONAL ATTENDANCE PROVISIONS

Health Sciences

Requirements for instructional hours within Health Science and Cosmetology programs reflect the rules of respective licensure boards and/or accrediting agencies. Therefore, these programs have stringent attendance policies. Each program's attendance policy is published in the program's handbook and/or syllabus which specify the number of allowable absences. All provisions for required make-up work in the classroom or clinical experiences are at the discretion of the instructor.

Attendance is counted from the first scheduled class meeting of each semester. To receive credit for a course a student must attend at least 90% of the scheduled instructional time. Time and/or work missed due to tardiness or absences must be made up at the convenience of the instructor. Any student attending less than the required scheduled instructional time (90%) may be dropped from the course as stated below in the Withdrawal Procedure.

Tardy means arriving after the scheduled time for instruction to begin. Early departure means leaving before the end of the scheduled time. Three (3) tardies or early departures equal one (1) absence for

the course.

For this class, which meets 1 days a week for 15 weeks, the maximum number of days a student may miss is 2 days during the semester.

ACADEMIC DISHONESTY POLICY: The STC Academic Dishonesty Policy states *All forms of academic dishonesty, including but not limited to cheating on tests, plagiarism, collusion, and falsification of information, will call for discipline.* The policy can also be found in the *STC Catalog and Student Handbook.*

Procedure for Academic Misconduct
The procedure for dealing with academic misconduct and dishonesty is as follows:

--First Offense--
Student will be assigned a grade of "0" for the test or assignment. Instructor keeps a record in course/program files and notes as first offense. The instructor will notify the student's program advisor, academic dean, and the Registrar at the student's home campus. The Registrar will input the incident into Banner for tracking purposes.

--Second Offense--
Student is given a grade of "WF" for the course in which offense occurs. The instructor will notify the student's program advisor, academic dean, and the Registrar at the student's home campus indicating a "WF" has been issued as a result of second offense. The Registrar will input the incident into Banner for tracking purposes.

--Third Offense--
Student is given a grade of "WF" for the course in which the offense occurs. The instructor will notify the student's program advisor, academic dean, and the Registrar at the student's home campus indicating a "WF" has been issued as a result of second offense. The Vice President for Student Affairs, or designee, will notify the student of suspension from college for a specified period of time. The Registrar will input the incident into Banner for tracking purposes.

STATEMENT OF NON-DISCRIMINATION: Southeastern Technical College does not discriminate on the basis of race, color, creed, national or ethnic origin, gender, religion, disability, age, disabled veteran, veteran of Vietnam Era or citizenship status, (except in those special circumstances permitted or mandated by law). This school is in compliance with Title VI of the Civil Rights Act of 1964, which prohibits discrimination on the basis of race, color, or national origin; with the provisions of Title IX of the Educational Amendments of 1972, which prohibits discrimination on the basis of gender; with the provisions of Section 504 of the Rehabilitation Act of 1973, which prohibits discrimination on the basis of handicap; and with the American with Disabilities Act (ADA).

GRIEVANCE PROCEDURES: Grievance procedures can be found in the Catalog and Handbook located on STC's website.

ACCESS TO TECHNOLOGY: Students can now access Blackboard, Remote Lab Access, Student Email, Library Databases (Galileo), and BannerWeb via the mySTC portal or by clicking the Current Students link on the STC website at www.southeasterntech.edu.

GRADING POLICY		**GRADING SCALE**
Power Point Presentation	130 points	A: 90-100
Chapter Test	150 points	B: 80-89
Worksheets/Laboratory	100 points	C: 70-79
Final Exam	120 points	D: 60-69
Total Points Possible	500 points	F: 0-59

TCSG GUARANTEE/WARRANTY STATEMENT: *The Technical College System of Georgia guarantees employers that graduates of State Technical Colleges shall possess skills and knowledge as prescribed by State Curriculum Standards. Should any graduate employee within two years of graduation be deemed lacking in said skills, that student shall be retrained in any State Technical College at no charge for instructional costs to either the student or the employer.*

RADT 1160
Power Point Presentation Expectations

Power Point Presentation should be well organized with a brief history of the modality, purpose of the imaging modality, basic principles (explanation of how it works, components of the modality, does it use radiation, sound, etc.?), types of information gained with this modality (common exams) and why this modality might be ordered on a patient.

Additionally, explain if the modality requires post primary certification to perform these exams? If so, what type of professional development does this modality require to maintain licensure/certification? Know your topic as if you are teaching the class about this modality or do this every day at the clinical site. Impress me by your knowledge of the subject you are discussing.

Presentation can be pre-recorded using video camera, Photo Story, Movie Maker, iMovie, etc. Or presentation can be presented live during class. All pre-recorded presentations should be posted to You Tube as unlisted and the link provided to the instructor.

Power Point Etiquette

When working with PowerPoint you must remember that the goal is to deliver information clearly and concisely. Anything that distracts from those goals is not acceptable. Try limit yourself to:

- Only 1 background (theme)
- No more than 2 fonts
- No more than 2 types of animations
- Avoid too many sounds with the animation

Other things of importance:

- Avoid wordiness (no more than 25 words per page)
- Avoid putting more than seven bulleted points on a slide
- An image on every slide
- Organization is the key. You want there to be an easy to follow structure to your presentation.

Topic of Power Point Presentation	**Student**	**Date of Presentation**
Bone Density		
Mammography		
Computed Tomography		
Magnetic Resonance Imaging		
Nuclear Medicine		
Ultrasound/Sonography		
Radiation Therapy		
Vascular Imaging		
American Registry of Radiologic Technologist (ARRT)		

RADT 1160 – Principles of Imaging II Fall SEMESTER 2016 LESSON PLAN			
Date		**Content, Assignments, & Tests**	***Course/****Gen Ed**
August 17		Review syllabus, classroom policies, etc. Read Chapter 3 & 4 - Carlton	1/c
August 24		Electricity & Electromagnetism/Classroom Review Chapter 3 & 4 - Carlton	
August 31		**Test** – Electricity & Electromagnetism Chapter 5 – Carlton/X-ray Equipment Review/Classroom activity	1/c
Sept. 7		**Test** – X-ray Equipment Chapter 6 – Carlton/X-ray Tube Review/Classroom activity	1/c
Sept. 14		**Test** – X-ray Tube Chapter 23 – Digital Radiography/Lab activity	1/c
Sept. 21		Chapter 23 – Digital Radiography Power Point/Lab activity results review	1,2/c
Sept. 28		**Test** – Digital Radiography Chapter 24 – Picture Archiving and Communication Systems(PACS)	1,2/c
October 5		**Test** – PACS Chapter 31 – Quality Management/ Lab Activity	1,2/c
October 12		**Test** – Quality Management Chapter 33 – Carlton/Automatic Exposure Control	1,2/a,b,c
October 19		**Test** – Automatic Exposure Control Chapter 35 – Carlton/Mobile Radiography/Lab activity	1,2/c
October 26		**Test** – Mobile Radiography Chapter 36- Carlton/Fluoroscopy/Lab Activity	1,2/c
Nov. 2		**Test** – Fluoroscopy Chapter 37 – Carlton/Tomography and Digital Tomosynthesis	1,2,3/a,b,c
Nov. 9		No Class – Outside assignment to work on Power Point Presentation	1,2,3/c
Nov. 16		**Test** – Tomography and Digital Tomosynthesis Power Point Presentations	1,2,3/c
Nov. 30		**Final Exam**	1,2,3/a,b,c

*** Course Competency Areas:**

1. imaging equipment
2. digital image acquisition and display
3. basic principles of CT and other imaging modalities

GENERAL EDUCATION CORE COMPETENCIES:

a) The ability to utilize standard written English.
b) The ability to solve practical mathematical problems.
c) The ability to read, analyze, and interpret information.

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Southeastern Technical College
Radiologic Technology Degree Program

I _____ have read and understand the syllabus for RADT 1160. I have also been given the opportunity to ask questions to clarify any requirements listed on the syllabi. By signing this agreement I am acknowledging that I fully understand my requirements and grading criteria that I am responsible for. I agree to follow the guidelines and rules listed on the syllabi.

_____
Print Name

_____ _____
Student Signature Date