



Radiographic Imaging
RADT 1075
COURSE SYLLABUS
Fall Semester 2017

Semester: Fall

Course Title: Radiographic Imaging

Course Number: RADT 1075

Credit Hours/ Minutes: 4 / 3750

Class Location: Room #743

Class Meets: 8:00 AM – 12:00 PM/Monday & Tuesday

CRN: 20239

Instructor: Tara W. Powell

Office Hours: Mondays 1 – 5 PM/Thursdays 1 – 5 PM

Office Location: ROOM 714, Gillis Building

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Phone: 912-538-3152

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Tutoring Hours: By appointment

REQUIRED TEXT: Fauber, T. (2013). *Radiographic Imaging & Exposure*, 5th edition. St. Louis, MO: Elsevier
ISBN: 978-0-323-35624-4

REQUIRED SUPPLIES & SOFTWARE: Pen, Pencil, Highlighter, Paper, calculator

COURSE DESCRIPTION: The content of this course introduces factors that govern and influence the production of the radiographic image using analog and digital radiographic equipment found in diagnostic radiology. Emphasis will be placed on knowledge and techniques required to produce high quality diagnostic radiographic images.

MAJOR COURSE COMPETENCIES:

1. Principles of Imaging and Image Quality
2. Criteria for Image Evaluation
3. Image Acquisition and Processing (Analog and Digital)
4. Exposure Indicator Determination
5. Analog vs. Digital Imaging Systems

PREREQUISITE(S): NONE

COURSE OUTLINE:

1. Principles of Imaging and Image Quality			
	Description	Learning Domain	Level of Learning
1.1	Discuss practical considerations in setting standards for acceptable image quality.	Cognitive	Comprehension
1.2	Describe film screen characteristics of density, contrast, recorded detail and distortion.	Cognitive	Comprehension
1.3	Identify and analyze the relationships of factors that control and affect radiographic density.	Cognitive	Knowledge
1.4	Identify and analyze the relationship of factors that control and affect radiographic contrast.	Cognitive	Analysis
1.5	Identify and analyze the relationships of factors that control and affect recorded detail and visibility of detail.	Cognitive	Analysis
1.6	Identify and analyze the relationship of factors that control and affect distortion.	Cognitive	Analysis
1.7	Differentiate between size and shape distortion.	Cognitive	Analysis
1.8	Perform calculations to determine image magnification and percent magnification.	Psychomotor	Guided Response

1.9	Summarize the relationship of factors affecting exposure latitude and film latitude.	Cognitive	Comprehension
1.10	Apply conversion factors for changes in the following areas: distance (inverse square law), grid, image receptor speed class, mAs reciprocity, density maintenance and the 15 percent rule.	Cognitive	Application
1.11	Describe the basic principles of digital radiography and the terminology associated with digital imaging systems.	Cognitive	Comprehension
1.12	Define digital imaging characteristics of receptor exposure, contrast, spatial resolution and distortion.	Cognitive	Knowledge
1.13	Describe digital imaging characteristics related to spatial resolution to include pixel size, matrix size, bit depth, contrast resolution, sampling frequency, and DEL size.	Cognitive	Comprehension
1.14	Describe digital imaging characteristics related to image signal, to include dynamic range, quantum mottle (noise), signal-to-noise ratio and contrast-to-noise ratio.	Cognitive	Comprehension
1.15	Define window level and window width and how they translate into displayed image brightness and gray scale.	Cognitive	Knowledge
1.16	Define scattered/secondary radiation and the effects of scattered radiation on the image.	Cognitive	Knowledge
1.17	Identify and compare grid types and identify the most appropriate grid for a given clinical situation.	Cognitive	Knowledge
1.18	Interpret grid efficiency in terms of grid ratio and frequency.	Cognitive	Evaluation
1.19	Compare short dimension vs. long dimension grids.	Cognitive	Analysis
1.20	Define grid cut off, summarize factors affecting grid cut off, and describe the various grid artifacts.	Cognitive	Knowledge

2. Criteria for Image Evaluation

	Description	Learning Domain	Level of Learning
2.1	Identify the criteria for image evaluation.	Cognitive	Knowledge
2.2	Apply problem-solving process for evaluating images for adequate density/brightness, contrast, recorded detail/spatial resolution and acceptable limits of distortion.	Cognitive	Application
2.3	Identify factors relating to image identification and documentation of ordered exam(s).	Cognitive	Knowledge
2.4	Evaluate images to determine the appropriate use of beam restriction.	Cognitive	Evaluation
2.5	Identify common equipment malfunctions that affect image quality, and corrective action.	Cognitive	Knowledge
2.6	Differentiate between technical factor problems, procedural factor problems and equipment malfunctions.	Cognitive	Analysis
2.7	Identify causes of film screen image fog (film age, chemical, radiation, temperature safelight)	Cognitive	Knowledge
2.8	Critique images for appropriate technical, procedural and pathologic factors, and employ corrective actions if necessary.	Cognitive	Evaluation

3. Image Acquisition and Processing (Analog and Digital)

	Description	Learning Domain	Level of Learning
3.1	Explain film-screen latent image formation.	Cognitive	Comprehension

3.2	Describe film-screen processing and film storage.	Cognitive	Knowledge
3.3	Discuss the steps of the processing cycle (develop, fix, wash, dry) and effects on image quality.	Cognitive	Comprehension
3.4	Identify the purpose of a daily quality control program for processors.	Cognitive	Knowledge
3.5	Identify types and causes of film screen image artifacts.	Cognitive	Knowledge
3.6	Describe the various types of digital receptors (Computed Radiography and Digital Radiography, including direct digital and indirect digital capture)	Cognitive	Knowledge
3.7	Discuss the fundamentals of digital radiography, distinguishing between cassette-based systems and cassette-less systems.	Cognitive	Comprehension
3.8	Compare the image acquisition and extraction of cassette-based vs. cassette-less systems, including detector mechanism, initial image processing, histogram analysis, automatic rescaling, look up tables and exposure index determination.	Cognitive	Synthesis
3.9	Compare detector properties and evaluation criteria such as DQE (detective quantum efficiency), exposure index, and spatial resolution.	Cognitive	Synthesis
3.10	Describe digital receptors, to include: Amorphous selenium/Thin film transistor (TFT) arrays, Cesium iodide/amorphous silicon thin film transistor (TFT) arrays, Charged coupled device (CCD) and complementary metal oxide semiconductor (CMOS) systems and Photostimulable phosphor (PSP) plates.	Cognitive	Knowledge
3.11	Compare the advantages and limits of each digital system.	Cognitive	Analysis
3.12	Describe the response of digital detectors to exposure variations.	Cognitive	Knowledge
3.13	Compare dynamic range to latitude of a screen/film receptor system to that of a digital radiography system.	Cognitive	Analysis
3.14	Describe the response of PSP systems to background and scatter radiation.	Cognitive	Knowledge
3.15	Identify grid use errors associated with grid cut off and Moire' effect.	Cognitive	Knowledge
3.16	Identify common limitations and technical problems encountered when using PSP systems.	Cognitive	Knowledge
3.17	Employ appropriate beam/part/receptor alignment to avoid histogram analysis errors.	Cognitive	Knowledge
3.18	Describe the selection of technical factors and technical factor systems to assure appropriate receptor exposure levels for digital detectors.	Cognitive	Knowledge
3.19	Describe the conditions that cause quantum mottle in a digital image.	Cognitive	Knowledge
3.20	Formulate a procedure or process to minimize histogram analysis and rescaling errors.	Cognitive	Application
3.21	Describe the histogram and the process of histogram analysis as it relates to automatic rescaling and determining an exposure indicator.	Cognitive	Knowledge
3.22	Relate the receptor exposure indicator values to technical factors, system calibration, part/beam/plate alignment and patient exposure.	Cognitive	Analysis

4. Exposure Indicator Determination			
	Description	Learning Domain	Level of Learning
4.1	Describe the difference between dose area product (DAP) measured with a flat panel system vs. the vendor specific exposure indicators for a PSP-based system.	Cognitive	Knowledge
4.2	Identify optimal value ranges for exposure indicators and relationship to patient exposure.	Cognitive	Knowledge
4.3	Describe the exposure precautions and limitations associated with PSP-based systems.	Cognitive	Knowledge
4.4	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	Synthesis

5. Analog vs. Digital Imaging Systems			
	Description	Learning Domain	Level of Learning
5.1	Describe the components of Picture Archival and Communications System (PACS) and its function.	Cognitive	Knowledge
5.2	Identify modality types that may be incorporated into a PACS.	Cognitive	Knowledge
5.3	Describe the components of the PACS, RIS, HIS, and the DICOM standard.	Cognitive	Knowledge
5.4	Describe data flow for a DICOM image from an imaging modality to a PACS.	Cognitive	Knowledge
5.5	Identify common problems associated with retrieving/viewing images within a PACS.	Cognitive	Knowledge
5.6	Identify the primary uses of the diagnostic display workstation and clinical display workstation.	Cognitive	Knowledge
5.7	Describe patient benefits gained through the use of teleradiology.	Cognitive	Knowledge
5.8	Describe HIPAA concerns with electronic information.	Cognitive	Knowledge
5.9	Discuss and define digital image processing, to include equalization, smoothing, electronic masking, edge enhancement, and grayscale (bit depth, look up table (LUT)).	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:

Prior to the discussion of each chapter in class, the student is expected to complete the following:

1. Read the assigned chapter.
2. Know the answers to the review questions at the end of each chapter.
3. Know the definitions of the key terms listed at the beginning of each chapter.
4. Complete all activities for assigned chapter.

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

TESTING POLICY: Prior to beginning any exam, all students are required to place all textbooks and personal property underneath the whiteboard in the front of the classroom. Students are to rotate seats prior to testing. No talking is allowed once the exam begins. Once a student completes his/her exam, he/she will turn the exam paper over and remain at his/her desk quietly until everyone has finished with the exam. This will prevent other students from being distracted as students exit. Then, the instructor will take up all exam papers. Students found with their cell phone or any other personal communication device during the exam will be considered cheating and given a zero for the exam.

FINAL EXAM: A final exam will be given to students and will be a 50-question comprehensive exam.

Laboratory Activities:

All students will be required to adhere to the program Laboratory Policy while performing laboratory activities during RADT 1075. Students are required to purchase a radiation dosimeter on the first day of classes. Students must wear their dosimeters while performing laboratory activities requiring an exposure. Any student who does not have their dosimeter on the day laboratory activities are scheduled will forfeit the laboratory activity and receive a grade of 0 for the laboratory.

RADIOLOGIC TECHNOLOGY LABORATORY POLICY

- 1) Laboratory use is restricted to only those students enrolled in the program of Radiologic Technology.
- 2) Laboratory use is restricted to educational assignments only.
- 3) All laboratory experiences will be conducted under direct supervision by program faculty/a qualified radiographer.
- 4) All students must wear radiation monitoring devices during all laboratory assignments requiring an exposure.
- 5) All persons must go into the control area during a radiographic exposure.
- 6) Laboratory doors must be closed during exposures.
- 7) Only phantoms or non-living objects may be used as subjects when performing an experiment or practice examination.
- 8) Care must be taken in the handling of phantoms. They are heavy and very expensive.
- 9) Care must be taken in the handling of all other equipment and supplies.
- 10) All items must be returned to their designated place in the laboratory after use.
- 11) Students are responsible for the proper use of the processor.
 - a. Chemicals used in the darkroom will adhere to the following guidelines:
 - I. All chemicals used by the Radiologic Technology program students will be stored in marked containers and labeled accordingly.
 - II. All chemicals will be used and/or disposed of under conditions as recommended by the manufacturer.
 - III. Material Safety Data Sheets (MSDS) will be maintained on all chemicals.
- 12) Student radiographs must either be submitted to the appropriate faculty member or placed in the reject film container.
- 13) The laboratory must be kept neat and clean. Students are responsible for maintaining the laboratory when performing experiments or practice procedures.
 - a. Cassettes shall be refilled and returned to the cassette credenza in the control area.
 - b. The film bin shall be kept full and organized.
 - c. Trash shall be discarded of in an appropriate trash container.
 - d. Safelights and overhead lights shall be turned off or unplugged when leaving the lab.
- 14) After use of the table and upright bucky will be cleaned with antiseptic solution.
- 15) Any non-functioning equipment must be reported to a faculty member as soon as possible.

* These rules apply to all radiographic rooms that are used for any lab assignments. *

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, etc.), will receive a zero on their next chapter test grade. In the event of an emergency, such as a sick family member or sick child, 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.

ADDITIONAL ATTENDANCE PROVISIONS

Health Sciences

Requirements for instructional hours within Health Science 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. A tardy will be issued if a student has missed less than 20% of instructional class time. An automatic absence will be issued if the student misses greater than 20% of instructional class time. This averages out to 10 minutes per hour. For example, a class that meets from 9:00-11:30 will be considered absent if he/she is not in class by 9:30.

The didactic portion of the class will meet for 75 hours. A student is allowed to miss a maximum of 7.5 hours. Students missing more than 7.5 hours (1.5 class meetings) will be dropped for exceeding the attendance policy.

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 assessed 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.

MAKEUP GUIDELINES (Tests, quizzes, homework, projects, laboratory, etc....): A grade of zero will be assigned for any missed assignment regardless of the reason. No quizzes or homework will be made up. No late homework assignments will be accepted. Additionally, there is no makeup for any missed laboratories performed in this course.

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

Tests	total points	175
Worksheets	total points	60
Laboratory	total points	15
Final Exam	total points	50
Total points possible		300

GRADING SCALE

A:	90-100
B:	80-89
C:	70-79
D:	60-69
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 1075 – Radiographic Imaging
Fall SEMESTER 2017 LESSON PLAN**

Date	Chap / Less	Content	Assignments & Tests Due	Comp Area
Week 1				
Aug		Syllabus, Sign & Send of Policies/Procedures Purchase Dosimeter		
Aug	Chap 1 & 2	Lecture/Review – Radiation and It's Discovery & The X-ray Beam	Read Chapter 1 & 2 Laboratory	3
Week 2				
Aug	Chap 3	Test - Radiation and It's Discovery & X-Ray Beam Test review & begin Chapter 3	Chapter 2 Worksheet & Laboratory Due Read chapter 3	3
Aug	Chap 3	Lecture/Lab - Image Formation & Radiographic Quality	Laboratory Chapter 3 – Image Formation & Radiographic Quality	3
Week 3				
Aug	Chap 4	Test - Image Formation & Radiographic Quality Test review & begin Chapter 4	Chapter 3 Laboratory Due Read Chapter 4	2
Aug	Chap 4	Lecture – Digital Imaging	Laboratory / Worksheet	2
Week 4				
Sept	Chap 6	Test – Digital Imaging Test review & begin Chapter 6	Chapter 4 Laboratory & Worksheet Due Read Chapter 6	1,2, 3
Sept	Chap 6	Lecture/lab – Exposure Technique	Laboratory & Worksheet	1
Week 5				
Sept	Chap 7	Test – Exposure Technique Test review & begin Chapter 7	Chapter 6 Laboratory & Worksheet Due Read Chapter 7	1
Sept	Chap 7	Lecture/lab – Scatter Control	Laboratory & Worksheet	4,5
Week 6				
Sept	Chap 8	Test – Scatter Control Test review & begin Chapter 8	Chapter 7 Laboratory & Worksheet Due Read Chapter 8	4,5
Sept	Chap 8	Lecture/lab – Exposure Technique Selection	Laboratory Chapter 8 – Exposure Technique Selection 8	4,5
Week 7				
Sept	Chap 9	Test – Exposure Technique Selection Test review & Chapter 8 Exposure Technique Selection - Lecture	Chapter 8 Laboratory Due Read Chapter 9 Worksheets Chapter 9	4,5
Sept	Chap 9	Lecture/lab – Image Evaluation	Laboratory Chapter 8 & 9	2,3
Week 8				
Oct	Chap 9	Test - Image Evaluation Test review	Chapter 9 Laboratory & Worksheets Due Study for Final Exam	2,3

Oct	Chap 1,2,3,4, 6,7,8,9	Final Exam		1,2,3,4,5
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*** Competency Areas: (will vary for each course/taken from state standards)**

1. Principles of Imaging and Image Quality
2. Criteria for Image Evaluation
3. Image Acquisition and Processing (Analog and Digital)
4. Exposure Indicator Determination
5. Analog vs. Digital Imaging Systems

****General Core Educational 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.



**Southeastern Technical College
Radiologic Technology Degree Program**

I _____ have read and understand the syllabus for RADT 1075. 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