

EL CAMINO COLLEGE  
Division of Health Sciences and Athletics  
**RADIOLOGIC TECHNOLOGY--RT 111**  
**FUNDAMENTALS OF RADIOLOGIC TECHNOLOGY**  
Fall Semester, 2011

|                             |   |
|-----------------------------|---|
| <b>Instructor:</b>          | Kelly Holt, M.S., R.T. (R)(CT) (ARRT), C.R.T. (R,F)               |
| <b>E-mail:</b>              | kholt@elcamino.edu  |
| <b>Office Hours:</b>        | Mon. 1pm – 2pm, Tues. 7:30am - 8:30am, Wed. 3pm – 4pm             |
| <b>Class Lecture Hours:</b> | Tuesday 9am – 12:10pm in PHYS 116                                 |
| <b>Class Lab Hours:</b>     | Fridays 9:00am – 12:10pm <b>OR</b> 1:00pm – 4:10pm in MCS 10 & 12 |

**Course Web Page: [www.elcamino.edu/faculty/kholt](http://www.elcamino.edu/faculty/kholt)**

**TEXTBOOKS & COURSE SUPPLIES:**

Stewart C. Bushong. Radiologic Science for Technologists. Mosby Publishers, Inc., 2008. 9<sup>th</sup> edition  
Stewart C. Bushong. Radiologic Science Workbook & Lab Manual. Mosby, Publishers, Inc. 9<sup>th</sup> edition  
Adler & Carlton. Introduction to Radiologic Sciences and Patient Care. Mosby Publishers, Inc., 4<sup>th</sup> edition  
Statkiewicz Sherer, Visconti, Ritenour. Radiation Protection in Medical Radiography. Mosby Publishers, Inc., 2002. 5<sup>th</sup> edition  
Carter, Veale. Digital Radiography and PACS. Mosby Publishers, Inc., 2009 1<sup>st</sup> edition  
Calculator, Sharpie, Flash Drive, Access to the internet, 16 tab dividers & 2 inch notebook

**SUPPLEMENTAL STUDY MATERIALS:**

Richard Carlton. Principles of Radiographic Imaging.  
Richard Carlton. Principles of Radiographic Imaging Lab Manual.  
State of California. Syllabus on Radiography/Fluoroscopy.

**COURSE DESCRIPTION:**

RTEC 111 is one of the Radiologic Technologist Program courses designed to develop your technical knowledge and abilities, as well as foster professional growth. You will find the subject material offered, to bridge the clinical and theoretical portions of your education. The material covered will also assist you in your transition into the hospital environment. We will cover the following areas: methods of recording medical images, radiographic technique & image quality, radiographic equipment & accessories, radiation protection, and some basic patient care methods as well as an introduction to fluoroscopy. This course will focus on the property of x-ray, the production of x-ray, the interaction of radiation and matter, image processing; analog, computerized & digital, characteristics of film, radiographic equipment and accessories, and basic radiation protection all within lecture and laboratory settings. Your success in future courses is greatly dependent upon your retention and understanding of the material offered in this course. Your instructor is available to provide additional time, references and suggestions to assist you in your goal(s).

**COURSE LEARNING OUTCOME:** Students will be able to analyze radiographic images for diagnostic quality contrast, density and recorded detail. The student will be able to make appropriate adjustments of the x-ray equipment to correct basic errors with the image.

**REMEMBER ..... WHERE THERE IS A WILL THERE IS AN “A”**



## **COURSE OBJECTIVES:**

By the end of this course the student will be able to:

1. Describe the physical concepts of energy and the basic structure of matter, the principles of x-ray production, the relationship of x-ray photon interaction with matter and the effects of radiation exposure produced in humans. Formulate appropriate radiographic exposure factors and select correct factors on an x-ray machine control panel to produce radiographic images using radiographic phantoms.
2. Identify, label and describe the function of the equipment used in radiography such as; an x-ray tube, the x-ray circuit, image receptors (film based and digital) , digital image (direct and indirect capture) processing equipment, a film processor and darkroom equipment. Demonstrate safe manipulation and operation of radiographic equipment.
3. Compare and contrast how radiographic images are acquired, processed, viewed and archived using screen/film, computerized and direct digital radiography systems.
4. List the x-ray exposure factors that are controlled by a technologist and evaluate how these factors can affect radiographic quality, density and contrast (subject and film contrast) on a radiographic image. Calculate the new kilovoltage peak or milliamperage-seconds needed to maintain density when other technical factors change. Produce images that demonstrate the effects of changes in kilovoltage, milliamperage, filtration, distance, film and screen types and speed, and the anode heel effect on x-ray output exposure, density and contrast, using radiographic phantoms, stepwedge devices, and ionization chambers.
5. Demonstrate the proper use of radiographic equipment and accessory items to produce high quality radiographs such as; darkroom processing, computerized processing, image display, and radiation protection techniques. Compare and contrast how proper use of these devices and processing can influence the outcome image and patient dose.
6. Perform experiments to demonstrate collimation changes and control of scatter radiation and accuracy (field size accuracy, X-ray/light-field congruence) and the effects of collimation on radiation protection and patient dose. Compare and contrast beam restriction with post processing electronic shuttering.
7. Define recorded detail and distortion and their effects on image quality. Produce radiographic images demonstrating changes in; source and subject-film distance, factors that influence image sharpness (penumbra), focal spot size, motion, magnification and distortion.
8. State the inverse square law, calculate and demonstrate exposure changes with a given distance change using a radiographic phantom and step-wedge in the lab.
9. Describe picture archiving and communication systems (PACS), digital imaging and communications in medicine (DICOM) and teleradiography and their function in digital imaging.
10. Differentiate how brightness and contrast, window leveling and window width influence radiographic images displayed on a computer monitor. Compare and contrast film and digital cassette exposures to quality images and patient dose.
11. Classify the units of radiation and measurement, then explain and demonstrate the use of devices to detect and measure radiation using an ionization chamber and radiographic phantom.

12. Differentiate between the various advisory groups and regulatory agencies involved in developing radiation protection standards. Correlate the protection standards set by the regulatory agencies to the standard practices of radiation safety for the patients, technologists and other medical staff.

13. Perform additional experiments, using phantoms and accessories, to illustrate various types of: grids and grid errors, air gap technique, intensifying screens (type and speed), poor screen-film contact, safe light testing and other quality control and equipment testing.

**COURSE REQUIREMENTS:**

***YOUR REGULAR, PUNCTUAL ATTENDANCE IS IMPORTANT.*** If you are not present in class, you can not acquire the information necessary to provide **SAFE & QUALITY** care to your patients. If, during the semester your hours absent exceed the number of units for the course, **(3)** you may be dropped from the class and dismissed from the program. Tardiness is an unacceptable habit. Tardiness is not only disruptive and disrespectful, but a sign of poor preparation and interest. Three **(3)** tardies equal one absence.

**CLASS BEHAVIOR:** That disrupts the learning process will not be tolerated. This includes: talking to others during lecture, demonstrations, quizzes or exams, sleeping or laying your head down during class, using cell phones for any reason, noises from electronic devices, wearing headphones, swearing and rude or disrespectful behavior. Cell phones usage of any kind will not be allowed in class. Please turn off or make silent your phone upon entering the class. Your cell phone may not be used for math calculations.

**METHODS OF INSTRUCTION:**

|                 |                        |
|-----------------|------------------------|
| Lecture         | Peer interaction       |
| Lab Experiments | Viewing of radiographs |
| Demonstration   | Handouts, etc          |
| Problem Solving |                        |

**STUDENT EVALUATION POLICY:**

The course grade will be calculated based on a number of components:

- **TESTS:** All tests shall be scheduled and announced at least one week in advance.
- **QUIZZES:** At the instructor's discretion quizzes may cover material to be covered for that class session or material from the previous class session. It is important to stay current with all reading pertaining to this class in order to do well on the quizzes. Quizzes may not always be announced.
- **LAB EXPERIMENTS:** Laboratory projects will be assigned by your instructor. Instructions will be provided and project partner(s) will be assigned when appropriate. Each project must be followed by a written summary that identifies the objective(s), the process and the findings.
- **OUTSIDE ASSIGNMENTS:** Outside assignments may include homework and special projects and oral presentation.
- **ATTENDANCE/PARTICIPATION:** participation will include punctuality, attendance and active participation/input during class and laboratory sessions. Attendance points will be of concern to those who have borderline A/B & B/C grades only. Attendance points WILL NOT bring a failing grade to a passing grade. Out of courtesy to your fellow classmates and instructor, please be punctual. Points will be lost for every tardy or absence acquired. Leaving early or leaving class for extended periods not during a break period will be counted as a tardy.
- **FINAL EXAM:** The final exam shall be cumulative.

**GRADING:** Total Points Possible for the course is approximately 775.

\*\*Exams = 300 (100 x 3) points  
Quizzes = 100 (various) points  
Projects/Lab Summaries= 150 points  
Final Exam (cumulative) = 200 points  
Outside Assignments/Homework = 25 points

| A        | B       | C       | D       | F             |
|----------|---------|---------|---------|---------------|
| 100%-91% | 90%-82% | 81%-73% | 72%-64% | 63% and Below |

**\*\* CUMMULATIVE MINIMUM OF 73% ON EXAM SCORES IS REQUIRED TO PASS THIS COURSE AND REMAIN IN THE PROGRAM.**

**ACADEMIC HONESTY:** Cheating of any kind is a serious breach of personal morality and an offense against your fellow students, your instructors, and the entire program. Any student found to be academically dishonest will receive 0 points for the assignment and may be dismissed from the course and/or program. See college catalog

**MAKE UP EXAMINATIONS:** Make up exams are allowed only if proper steps are followed. I must receive a phone call or e-mail from you before the examination begins and the exam must be made up prior to the next class session (unless other arrangements are made). Make up exams are subject to a 10% penalty. **Laboratory experiments and quizzes will not be made up.** It is your responsibility to collect handouts and other pertinent class information. It is **YOUR RESPONSIBILITY** to schedule the make-up exam with me.

**LATE WORK:** There will be a 10% deduction in points for every day your work is late. This is done to assure fairness to those students who complete their assignments on time.

**STUDENT SUCCESS:** As your instructor, my primary goal is your success. If you feel you may require special accommodations please come see me by week three of the semester.

**PROFESSIONALISM:** Part of our job is to maintain a professional working environment in class as well as in the laboratory. Please be aware that teamwork is essential for working in the real world and it is crucial during lab experiments also. Maintaining a safe environment for yourself and fellow classmates by practicing the principle of ALARA is essential. Proper radiation safety guidelines must be followed at all time during laboratory sessions.

**DROP POLICY:** It is the student's responsibility to formally withdraw from the class if they are no longer in attendance. If a formal withdrawal is not completed, the student will receive a letter grade of "F" for the course.

**CHILDREN:** Children are not permitted in the classroom while class is in session. Children are not permitted to sit outside the classroom.

**FOOD/BEVERAGES:** are not permitted in the classroom or lab. The only exception is bottled water with a cap.

**LAB SAFETY:** closed toed shoes with a flat sole and your dosimeter must be worn to participate in ionizing lab activities.