



Principles of Radiation Biology and Protection/RADT 1200 COURSE SYLLABUS Summer Semester 2017

Semester: Summer 2015

Course Title: Principles of Radiation Biology and Protection

Course Number: RADT 1200

Credit Hours/ Minutes: 3 / 2250

Class Location: Room # 743

Class Meets: Tuesday & Thursday/ 9:00 AM – 11:30 AM

CRN: 60091

Instructor: Tara W. Powell, MBA, R.T.(R)(M)(CT), RDMS

Office Hours: 7:30 AM – 11:30 & 12:30PM – 5:30 PM Thursday

Office Location: Room 714, Gillis Building

Email Address: tpowell@southeasterntech.edu

Phone: 912-538-3152

Fax Number: 912-538-3106

Tutoring Hours: By appointment

REQUIRED TEXT: Bushong, S., (2017). *Radiologic Science for Technologists: Physics, Biology, and Protection (11th edition)*. St. Louis, MO: Elsevier. ISBN: 978-0-323-35377-9

COURSE DESCRIPTION: Provides instruction on the principles of cell radiation interaction. Radiation effects on cells and factors affecting cell response are presented. Acute and chronic effects of radiation are discussed.

MAJOR COURSE COMPETENCIES: Major course competencies include: radiation detection and measurement; patient protection; personnel protection; absorbed dose equivalencies; agencies and regulations; introduction to radiation biology; cell anatomy; radiation/cell interaction; and the effects of radiation.

PREREQUISITE(S): Program Admission

COURSE OUTLINE:

Learning Outcomes			
Order	Description	Learning Domain	Level of Learning
1.0 Radiation Detection and Measurement			
1.1	Define terms used to measure ionizing radiation such as rem, roentgen, rad, C/kg, Sievert, and gray.	Cognitive	Knowledge
1.2	Distinguish between units of measure for ionizing radiation.	Cognitive	Analysis
1.3	Discuss personnel monitoring devices in terms of types, purposes, characteristics, advantages, and disadvantages.	Cognitive	Comprehension
1.4	List types of ionization chambers.	Cognitive	Knowledge
1.5	Describe the theory of operation for ionization chambers.	Cognitive	Comprehension
1.6	List types and sources of natural radiation and man-made radiation.	Cognitive	Knowledge
2.0 Patient Protection			
2.1	Explain the relationship of beam limiting devices to patient radiation protection.	Cognitive	Comprehension

2.2	Discuss added and inherent filtration in terms of the effect on patient dosage.	Cognitive	Comprehension
2.3	Explain the purpose and importance of patient shielding.	Cognitive	Comprehension
2.4	Given a list of patients shielding devices and radiographic procedures, correlate the method of shielding to the radiographic procedure.	Cognitive	Application
2.5	Explain the relationship of exposure factors to patient dosage. Cognitive Comprehension	Cognitive	Comprehension
2.6	Given various radiographic procedures, identify how to use different IRs that will result in an optimum diagnostic image with the minimum radiation exposure to the patient.	Cognitive	Application
2.7	Discuss methods to avoid repeat radiographs.	Cognitive	Comprehension
2.8	Explain how to reduce patient dose when performing stationary or mobile fluoroscopy, and mobile radiography.	Cognitive	Comprehension
3.0 Personnel Protection			
3.1	Explain the use of primary and secondary radiation barriers.	Cognitive	Comprehension
3.2	Discuss protection devices influencing room construction and design.	Cognitive	Comprehension
3.3	Clarify controlled areas from uncontrolled areas.	Cognitive	Analysis
3.4	Explain how radiographic equipment/techniques are used to reduce personnel exposure during radiographic, fluoroscopic, mobile, and surgical procedures.	Cognitive	Comprehension
3.5	Explain how personnel protective devices are used to reduce personnel exposure during radiographic, fluoroscopic, mobile, and surgical procedures.	Cognitive	Comprehension
3.6	Explain how patient restraint devices are used to reduce personnel exposure during radiographic, fluoroscopic, mobile, and surgical procedures.	Cognitive	Comprehension
4.0 Absorbed Dose Equivalencies			
4.1	Define effective dose equivalent.	Cognitive	Knowledge
4.2	Determine dose equivalent in terms of SI and traditional units when given the quality factor and absorbed dose for different ionizing radiations.	Cognitive	Application
4.3	Discuss current National Council on Radiation Protection and Measurements recommendations for occupational and general public	Cognitive	Comprehension
4.4	Describe dose limits related to the declared pregnant radiographer.	Cognitive	Comprehension
5.0 Agencies and Regulations			
5.1	Identify federal and state regulatory agencies.	Cognitive	Knowledge
5.2	Discuss historical perspectives relating to radiation protection.	Cognitive	Comprehension
5.3	Explain two purposes of Public Law 97-35.	Cognitive	Comprehension
5.4	Discuss state regulations regarding patient and personnel protection.	Cognitive	Comprehension
5.5	Identify components of 10 CFR part 20 related to personnel monitoring and dose limits.	Cognitive	Knowledge
5.6	Describe the "ALARA" concept in regards to personnel and patient protection.	Cognitive	Comprehension
5.7	Describe radiographer radiation protection responsibilities as they pertain to patients, personnel, and the public.	Cognitive	Comprehension
6.0 Introduction to Radiation Biology			
6.1	Discuss historical evidence of the effects of radiation.	Cognitive	Comprehension
6.2	Describe concepts relating to the interaction of radiation with matter.	Cognitive	Comprehension

6.3	Discuss the information concerning the human body as it relates to atomic structure.	Cognitive	Comprehension
7.0 Cell Anatomy			
7.1	Review the structures involved in cellular anatomy.	Cognitive	Comprehension
7.2	Describe the importance of the macromolecules in terms of cellular function.	Cognitive	Comprehension
8.0 Radiation/Cell Interaction			
8.1	Define radiation/cell interaction.	Cognitive	Knowledge
8.2	Discuss the effects of radiation on cells related to direct and indirect effect.	Cognitive	Comprehension
8.3	Delineate the four-basic radiation dose-response curves.	Cognitive	Analysis
8.4	Discuss the cellular factors that affect the radio sensitivity of each cell.	Cognitive	Comprehension
8.5	Identify physical characteristics of radiation that impact cell response.	Cognitive	Knowledge
8.6	Differentiate between radioprotectors and radiosensitizers.	Cognitive	Analysis
9.0 Effects of Radiation			
9.1	Explain the terms early and late effects of radiation.	Cognitive	Comprehension
9.2	Describe acute exposure in terms of somatic and genetic effects.	Cognitive	Comprehension
9.3	Differentiate whole body responses and local responses to acute exposure.	Cognitive	Analysis
9.4	Describe chronic exposure in terms of somatic and genetic effects.	Cognitive	Comprehension
9.5	Differentiate whole body responses and local responses to chronic exposure	Cognitive	Analysis
9.6	Distinguish between stochastic and deterministic effects of ionizing radiation.	Cognitive	Analysis

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

1. The ability to utilize standard written English.
2. The ability to solve practical mathematical problems.
3. The ability to read, analyze, and interpret information.

STUDENT REQUIREMENTS: Students are expected to complete all reading, tests, and daily assignments (Worksheets/handouts) by the specified date. Worksheet assignments/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.

EXAMS: Examinations will be given on a weekly basis to demonstrate the students understanding and proficiency in the course competency areas. No study guides will be provided to the students for exams and no exam grades will be dropped. Additionally, quizzes are subject to be given on any given day over any assigned material (i.e. reading, worksheets/handouts, etc.). Any quizzes missed due to student absence will not be made up.

Any questions regarding a test will need to be submitted by email to the instructor and/or an appointment can be arranged to discuss any questions during the instructor's office hours. No class time will be spent debating test questions.

MAKEUP GUIDELINES (Tests, quizzes, homework, projects, laboratory, etc....): A grade of zero will be assigned for any missed assignment regardless of the reason.

CELLPHONE POLICY: Cell phones are not permitted in the classroom or laboratory. Any student caught with a cell phone in the classroom or laboratory in any capacity (texting, talking on, taking pictures with, or emailing), whether the phone is on or off, 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.

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 2 days a week for 9 weeks, the maximum number of days a student may miss is 2 days during the semester.

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.

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 third 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: The Technical College System of Georgia and its constituent Technical Colleges do not discriminate on the basis of race, color, creed, national or ethnic origin, sex, religion, disability, age, political affiliation or belief, genetic information, disabled veteran, veteran of the Vietnam Era, spouse of military member 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).

The following individuals have been designated to handle inquiries regarding the nondiscrimination policies:

ADA/Section 504 - Equity- Title IX (Students) - OCR Compliance Officer	Title VI - Title IX (Employees) - EEOC Officer
Helen Thomas, Special Needs Specialist Vidalia Campus 3001 East 1 st Street, Vidalia Office 108 Phone: 912-538-3126 hthomas@southeasterntech.edu	Blythe Wilcox, Director of Human Resources Vidalia Campus 3001 East 1 st Street, Vidalia Office 138B Phone: 912-538-3147 bwilcox@southeasterntech.edu

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


Chapter exams (25 points each)	225 total points possible (75.2%)
Chapter Worksheets/handouts	25 total points possible (8.3%)
Final Exam	<u>50 total points possible (16.5%)</u>
	300 total points possible

GRADING SCALE

A: 270 – 300 points
B: 268 – 240 points
C: 238 – 210 points
D: 208 – 180 points
F: 178 – 0 points

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.*

Principles of Radiation Biology and Protection/RADT 1200 Summer SEMESTER 2017 LESSON PLAN				
Date	Chap / Less	Content	Assignments & Tests Due	Comp Area
Week 1				
May 18	29	Chapter 29 – Human Biology Lecture	Read Chapter 29 – Human Biology Worksheet/handout	7/a,b,c
May 23	29	TEST – Chapter 29 Human Biology	Worksheet/handout due	
Week 2				
May 25	30	Chapter 30 - Fundamental Principles of Radiobiology Lecture	Chapter 30 – Fundamental Principles of Radiobiology Worksheet/handout	6/a,b,c
May 30	30	TEST – Chapter 30 Fundamental Principles of Radiobiology	Worksheet/handout due	
Week 3				
June 1	31 & 32	Chapter 31 Molecular Radiobiology & Chapter 32 Cellular Radiobiology Lecture	Chapter 31 Molecular Radiobiology & Chapter 32 Cellular Radiobiology Worksheet/handout	7,8,9/a,b,c
June 6	31 & 32	TEST – Chapter 31 Molecular Radiobiology & Chapter 32 Cellular Radiobiology	Worksheet/handout due	7,8,9/a,b,c
Week 4				
June 8	33 & 34	Chapter 33 & 34 Lecture	Chapters 33 & 34 Deterministic Effects of Radiation Stochastic Effects of Radiation Worksheet/handout	7,8,9/a,b,c
June 13	33 & 34	TEST – Chapter 33 Deterministic Effects of Radiation & Chapter 34 Stochastic Effects of Radiation	Worksheet/handout due	7,8,9/a,b,c
Week 5				
June 15	35	Chapter 35 – Health Physics	Chapter 35 – Health Physics	1,4,5/a,b,c

		Lecture	Worksheet/handout	
June 20	35	TEST – Chapter 35 Health Physics	Worksheet/handout due	1,4,5/a,b,c
Week 6				
June 22	36	Chapter 36 Designing for Radiation Protection Lecture	Chapter 36 – Designing for Radiation Protection Worksheet/handout	1/a,b,c
June 27	36	TEST – Chapter 36 Designing for Radiation Protection	Worksheet/handout due	
Week 7				
June 29	37	Chapter 37 Radiography/Fluoroscopy Patient Radiation Dose Lecture	Chapter 37 – Radiography/Fluoroscopy Patient Radiation Dose Worksheet/handout	2/a,b,c
July 3 rd – July 6 th				
 Summer Break				
July 11	37	TEST - Chapter 37 Radiography/Fluoroscopy Patient Radiation Dose	Worksheet/handout due	2/a,b,c
Week 8				
July 13	39	Chapter 39 – Patient Radiation Dose Management Lecture	Chapter 39 – Patient Radiation Dose Management Worksheet/handout	2/a,b,c
July 18	39	TEST – Chapter 39 Patient Radiation Dose Management	Worksheet/handout due	2/a,b,c
Week 9				
July 20	40	Chapter 40 – Occupational Radiation Dose Management Lecture	Chapter 40 – Occupational Radiation Dose Management Worksheet/handout	3/a,b,c
July 25	40	TEST - Chapter 40 – Occupational Radiation Dose Management	Worksheet/handout due	3/a,b,c
July 31		Final Exam -9:00 AM		1-9/ a, b, c

†The lesson schedule is subject to change at the discretion of the instructor.

*** Competency Areas: (taken from state standards)**

1. Radiation detection and measurement
2. Patient protection
3. Personnel protection
4. Absorbed dose equivalencies
5. Agencies and regulations
6. Introduction to radiation biology
7. cell anatomy
8. radiation/cell interaction
9. effects of radiation.

****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.

