

**HEART of GEORGIA TECHNICAL COLLEGE
RADIOLOGIC TECHNOLOGY
RAD 120 Principles of Radiation Biology and Protection
COURSE SYLLABUS
Winter Quarter 2010**

Instructor Information

Instructor: Stephanie Morris, BS RT (R)(M)(CT)
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 Office: Room 224 T
 Louie Livingston Hall
 Class Days: Tuesday
 Class Dates: January 11th, 2010 thru March 23rd, 2010
 Class Times: 9am – 3:00 PM
 Classroom: Louie Livingston Hall 235
 Department Secretary: Mrs. Kim Noles
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 Department Chair: Mrs. Sylvia Rozier, MSN RN
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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. Topics 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 effects of radiation.

<u>Competency Areas</u>	<u>Hours</u>	
	Class	5
Radiation Detection and Measurement	D. Lab	0
Patient Protection	P.	0
Personnel Protection	Lab/O.B.I.	
Absorbed Dose Equivalencies	Credit	5
Agencies and Regulations		
Introduction to Radiation Biology		
Cell Anatomy		
Radiation/Cell Interaction		
Effects of Radiation		

Prerequisite: Program admission level competency in Math and English (diploma)
 Program admission level competency in Math, English, and Biology (degree)

Course Guide

Competency	After completing this section, the student will be able to:	Hours		
		Class	<u>D.Lab</u>	P.Lab/ O.B.I.
RADIATION DETECTION AND MEASUREMENT		5	<u>0</u>	0
Units of measure	Define terms used to measure ionizing radiation such as rem, roentgen, rad, C/kg, seivert, and gray. Distinguish between units of measure for ionizing radiation.			
Monitoring devices	Discuss personnel monitoring devices in terms of types, purposes, characteristics, advantages, and disadvantages.			
Ionization chambers	List types of ionization chambers. Describe the theory of operation for ionization chambers.			
Sources of radiation	List types and sources of natural radiation and man-made radiation.			
PATIENT PROTECTION		3	<u>0</u>	0
Beam limiting devices	Explain the relationship of beam limiting devices to patient radiation protection.			
Filtration	Discuss added and inherent filtration in terms of the effect on patient dosage.			
Shielding	Explain the purpose and importance of patient shielding. Given a list of patient shielding devices and radiographic procedures, correlate the method of shielding to the radiographic procedure			
Exposure factors	Explain the relationship of exposure factors to patient dosage.			
Image receptor system	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.			
Repeat radiographs	Discuss methods to avoid repeat radiographs.			
Fluoroscopy & Mobile procedures	Explain how to reduce patient dose when performing stationary or mobile fluoroscopy, and mobile radiography.			
PERSONNEL PROTECTION		6	<u>0</u>	0
Room construction and design	Explain the use of primary and secondary radiation barriers. Discuss protection devices influencing room construction and design. Clarify controlled areas from uncontrolled areas.			
Radiographic equipment and techniques	Explain how radiographic equipment/techniques are used to reduce personnel exposure during radiographic, fluoroscopic, mobile, and surgical procedures.			
Personnel protective devices	Explain how personnel protective devices are used to reduce personnel exposure during radiographic, fluoroscopic, mobile, and surgical procedures.			
Patient restraint devices	Explain how patient restraint devices are used to reduce personnel exposure during radiographic, fluoroscopic, mobile, and surgical procedures.			
ABSORBED DOSE EQUIVALENCIES		2	<u>0</u>	0
Definitions	Define effective dose equivalent.			
Formulas	Determine dose equivalent in terms of SI and traditional units when given the quality factor and absorbed dose for different ionizing radiations.			

Competency	After completing this section, the student will be able to:	Hours		
		Class	D.Lab	P.Lab/ O.B.I.
Dose limits	Discuss current National Council on Radiation Protection and Measurements recommendations for occupational and general public exposures.			
	Describe dose limits related to the declared pregnant radiographer.			
AGENCIES AND REGULATIONS		2	0	0
Agencies	Identify federal and state regulatory agencies.			
Evolution of standards	Discuss historical perspectives relating to radiation protection.			
Regulations	Explain two purposes of Public Law 97-35.			
	Discuss state regulations regarding patient and personnel protection.			
	Identify components of 10 CFR part 20 related to personnel monitoring and dose limits.			
Responsibilities	Describe the "ALARA" concept in regards to personnel and patient protection.			
	Discuss radiographer radiation protection responsibilities as they pertain to patients, personnel, and the public.			
INTRODUCTION TO RADIATION BIOLOGY		2	0	0
History	Discuss historical evidence of the effects of radiation.			
Interaction of radiation with matter	Describe concepts relating to the interaction of radiation with matter.			
Human anatomy as matter	Discuss the information concerning the human body as it relates to atomic structure.			
CELL ANATOMY		3	0	0
Structure	Review the structures involved in cellular anatomy.			
Function	Describe the importance of the macromolecules in terms of cellular function.			
RADIATION/CELL INTERACTION		19	0	0
Definition	Define radiation/cell interaction.			
Effects	Discuss the effects of radiation on cells related to direct and indirect effect.			
	Delineate the four basic radiation dose-response curves.			
Factors affecting cell response	Discuss the cellular factors that affect the radiosensitivity of each cell.			
	Identify physical characteristics of radiation that impact cell response			
Modifiers	Differentiate between radioprotectors and radiosensitizers.			
EFFECTS OF RADIATION		8	0	0
Definitions	Explain the terms early and late effects of radiation.			
Acute exposure	Describe acute exposure in terms of somatic and genetic effects.			
	Differentiate whole body responses and local responses to acute exposure.			
Chronic exposure	Describe chronic exposure in terms of somatic and genetic effects.			
	Differentiate whole body responses and local responses to chronic exposure.			
Potential biologic damage	Distinguish between stochastic and deterministic effects of ionizing radiation.			

Prerequisite: Program admission level competency in math and English (diploma)
Program admission level competency in math, English, and biology (degree)

Required Book:

Bushong, S. C. (2008). *Radiologic Science for Technologists* (9th ed) Mosby-Elsevier.

Required material:

Paper, pen, #2 pencils

Course Assignment Calendar

See last page...

HGTC STUDENT E-MAIL ACCOUNT:

Students at Heart of Georgia Technical College are assigned an e-mail account. To access your account, go to HGTC's webpage, www.heartofgatech.edu and click on the *Heartmail* link under the *Current Student* tab. Students who have questions or issues with their e-mail account should contact their instructor or contact the Instructional Technology Specialist at (478) 274-7835.

E-MAIL RESPONSE TIME

Unless there are extenuating circumstances, your instructor will respond to emails within 24 hours, Monday through Thursday.

Course Outline:

Chapter 32:	Human Biology
Chapter 33:	Fundamental Principles of Radiobiology
Chapter 34:	Molecular and Cellular Biology
Chapter 35:	Early Effects of Radiation
Chapter 36:	Late Effects of Radiation
Chapter 37:	Health Physics
Chapter 38:	Designing for Radiation Protection
Chapter 39:	Patient Radiation Dose Management
Chapter 40:	Occupational Radiation Dose Management

Attendance**

- If you are more than five (5) minutes late, you will be counted as tardy.
- **BREAK TIME:** 10 minutes - 10 point deduction on weekly quiz if late
- Arriving late or leaving early: Write your arrival or departure time, **AS SOON AS YOU ARRIVE or JUST BEFORE YOU LEAVE**, in the arrival/leave time **box on the board**. If you fail to do this, I you may be marked absent for the entire day.
- If you miss 10% of the total classes during the quarter, you will be dropped from the class in adherence to Radiologic Technology Program Policy.

Student Attendance Policy

Regular and punctual attendance is an important part of preparing a student for employment and is often a critical factor when employers review a student's record. Absences seriously disrupt a student's orderly progress in a course and significantly diminish the quality of group interaction in class. Regular and punctual attendance in all classes is the student's responsibility. Attendance is counted from the first scheduled class meeting of each quarter. Absence from class for any reason does not excuse a student from full responsibility for class work or assignments missed. The student is still responsible for preparing assignments for the next class meeting and for completing all work missed in accordance with the course syllabus.

All class meetings are important and require that a student abide by the attendance policies adopted for individual classes by instructors. Specific course attendance policies and penalties imposed for absences are left to the discretion of individual instructors. Programs governed by state and federal licensing agencies may have more specific attendance policies, which students must adhere to. The attendance policy will be stated in the course syllabus, which is distributed to students at the beginning of the quarter in each class. The instructor has the option of withdrawing students from the course that exceed the maximum number of permitted absences as defined by the course syllabus. Excessive absenteeism and tardiness impact work ethics evaluations and may affect course grades. If the withdrawal date occurs prior to midterm/midcourse, the student will receive a grade of

“W.” If the withdrawal occurs between midterm/midcourse and the 8th academic week (or 80%) of the quarter and the student has a “60” or above average, the grade is “WP.” For learning support classes, the student must have a “70” or above average. If the student has a “59” or lower average, or “69” or lower average for learning support classes, the grade is “WF.” If the withdrawal occurs after the 8th academic week (or 80%) of the quarter, the grade is “F.” Students will not be penalized when they are absent due to attending college-related activities. However, the student is responsible for making up missed work within the specified time period in accordance with the course syllabus at the convenience of the instructor. Students who anticipate an absence from class must contact their instructor prior to the absence. ***Students who miss more than 10% of the scheduled class days and do not contact their instructor may be withdrawn.***

Attendance Appeal Process

Students should discuss attendance matters with their instructor. Students with **extenuating** circumstances who wish to appeal violation of the attendance policy must do so within 48 hours of being withdrawn from the course. ***Students must attend class or log on to their on-line classes until the appeal decision is made. Students who fail to meet any scheduled appeal or fail to schedule a change prior to the scheduled appeal will be immediately withdrawn from the class or classes for which they initiated the appeal and will forfeit their right of additional appeals for the incident.***

Attendance Appeals—Credit Students

To initiate an appeal, the following procedure must be followed.

- A credit student who is not satisfied with the instructor’s decision may appeal to the Dean of Instructional Services. The credit student must write a letter or e-mail addressed to the Dean of Instructional Services stating the reason why the student was withdrawn from the course, stating reasons for absences, and providing reasons why the student should be reinstated to class. The letter should be submitted to the Academic Affairs Office. Students enrolled at the Little Ocmulgee Instructional Center must address letters to the Dean of the Little Ocmulgee Instructional Center. Written appeals should include copies of any documentation cited in support of the student’s case. Documentation, while helpful in determining the facts in a situation, does not guarantee reinstatement. The student is issued a pass to return to class and must attend class until the student meets with the Dean or his/her designee. The Dean or designee will review the documentation and render a decision within two (2) business days.
- If the student is denied reinstatement to class, the student may appeal the decision to the Executive Vice President within two (2) working days from the Dean’s or designee’s notification. The student must write a letter addressed to the Executive Vice President stating the reason why the Dean’s or designee’s decision should not be accepted and why the student should be reinstated to class. The student must submit the letter to the Academic Affairs Office. An appointment is then scheduled with the Executive Vice President. The student is issued a pass to return to class and must attend class until the student meets with the Executive Vice President or designee. The Executive Vice President or designee reviews the documentation and meets with the student within two (2) working days and renders a decision. The decision of the Executive Vice President shall be final.

****It is your responsibility to get missed lecture notes, handouts, and important announcements from either your classmates or your instructor.**

Withdrawal from this course

Midterm is February 15, 2010. Should you wish to withdraw from the class, please contact your advisor. Failure to do this will result in a failing grade, which will affect your GPA and perhaps your financial aid.

If you withdraw **before** the MIDTERM date, you will receive a “W” for your grade. **After** midterm, you will receive either a “WP” or a “WF”, depending on whether you were Passing or Failing at the time of withdrawal. A “WF” is calculated into your GPA. After the 8th week, a withdrawal will result in a “F”.

HGTC ID Badge

You **MUST** be wearing your HGTC ID badge and have it noticeably displayed to enter the class.

Attire

- Blue scrubs and white-based athletic shoes to class; White & Red Uniform to clinical

- Short fingernails
- No wet hair
- Uniforms pressed and wrinkle free
- Failure to follow guidelines for attire: 1st offense will result in a 50-point deduction from your weekly quiz grade: 2nd offense will result in a 50-point deduction from your weekly quiz grade and a work ethics grade of zero.

Cell Phones and Other Electronic Devices

- NO AUDIBLE RING TONES during class times
- Use “Vibrate” or “Off” modes
- 10 points deduction on that week’s quiz for each violation of an audible tone.
- 10 points deduction of that week’s quiz for each violation for excessive “vibrating” alerts during class
- No electronic devices such as a radio, walkman, etc.

Special Services

Students with special needs, whether the needs are learning, physical, or other, are strongly encouraged to talk with the course instructor. The instructor can refer the student to the Special Needs Facilitator, Mrs. Lydia Barfoot, or can consult with the Special Needs Facilitator on behalf of the student.

To ensure that students have every opportunity to success in their studies, other services such as tutoring and study skills are available. Students interested in these services should talk to the instructor or department chairperson. Tutoring is available through Lydia Barfoot. For an appointment with her, call 274-7652.

Exams

If you are not present at the start of the Exam process, you will not be permitted to take the Exam . The Exam process starts with the announcement of, “Clear your desks...”.

Make-up Exams

You must schedule your make-up exam before or after class on your **NEXT CLASS MEETING DAY! This means the next day that you are in class following the day(s) of your absence.** Please call or email the instructor to verify the make-up exam time. **If you do not, you will incur a 10-point deduction on the exam.**

The make-up exam may include Essay Questions, Multiple Choice, True/False, and/or Fill in the blank. The essay questions are in-depth, and must be answered in their entirety. Make-up Exams must be scheduled with the instructor.

HGTC Make-up Policy:

Unless approved otherwise by the instructor, students who have received prior approval from their instructor to make up work must make up work missed within three instructional days, or the grade is a zero.

Quizzes

Quizzes may be pre-scheduled weekly or “POP” quizzes. If you are not present at the start of the Quiz process, you will not be permitted to take the quiz . The Quiz process usually starts with the announcement of, “Clear your desks...”.
THERE WILL BE NO MAKE-UP QUIZZES.

Academic Irregularities

A student commits an academic irregularity when any of the following are involved:

1. copying another student’s work or plagiarizing any report, project, program or assignment
2. copying answers from another student or use of unauthorized notes during an exam
3. any assistance or system used to help another student during an exam
4. theft or unauthorized possession of exams, including old exams
5. absolutely no talking, motioning to a classmate or ANY FORM OF COMMUNICATION during testing times
6. Failure to remove all items from the top of your desk during testing
7. Failure remove all papers, open book bags, and open purses from the general area during testing

Such academic irregularities could result in one or more of the following:

1. a grade of "0" will be given for the test, lab project, report, etc.
2. a grade of "F" will be given for the course
3. dismissal from class

HGTC dishonesty policy:

ACADEMIC DISHONESTY: HGTC assumes that all students will be truthful to each other and to members of the college community. All forms of academic dishonesty, including but not limited to, the following will call for discipline:

- knowingly helping, procuring or encouraging another person to engage in academic misconduct.
- obtaining assistance with, or answers to, examination questions from another person, with or without, that person's knowledge.
- Furnishing assistance with or answers to examination to another person.
- Possessing, using, distributing or selling unauthorized copies of any examination or computer program.
- Representing as one's own an examination taken by another person.
- Obtaining unauthorized access to the computer files of another person or agency and/or altering or destroying those files.
- Obtaining teacher edition text books, test banks, or instructional materials that are only intended to be accessed by technical college personnel.
- Falsification of information.
- Plagiarism.

Any student guilty of any form of dishonesty in academic or laboratory work will receive a grade of zero for that work. The second incidence of dishonesty will result in the student being subject to dismissal from HGTC.

TRACS (Tutoring, Referral, Assessment, Career Services Center):

The TRACS Center offers a variety of services for all students. Services are provided in Room 113, W. R. Stewart Building, or available online through the HGTC website, under tab *Career Services*.

Tutoring services are provided to assist all HGTC students in achieving their maximum level of performance in their coursework. Free tutoring is available to students enrolled in credit programs by making a request to an instructor or by contacting TRACS. Study skills and test-taking skills also are available. Interested students should contact the TRACS Center at (478) 274-7786 or (478) 274-7643.

Referrals are made for students who need services provided on the campus of HGTC as well as services available in the community. Guidance services are available and designed to help students deal with personal, social and education concerns. Referral to professional counselors and/or community agencies will be arranged upon the request of the student. Personal counseling is voluntary and is strictly confidential. Students may be self-referred, referred by their instructors, or referred by outside agencies and organizations. For additional information contact the Career Center in Room 113 in the W. R. Stewart Building on the main campus.

Assessments are provided for the college placement assessment; third party assessments for updating professional credentials, earning certifications and licensure and work force development. For information about assessments, visit Room 306, W. R. Stewart Building, or call (478) 275-5193.

Career Services is a vital component of the Tutoring, Referral, Assessment, Career Services Center (TRACS). The Center offers a variety of services for all enrolled students, prospective students, and graduates. Students are provided with the skills and knowledge needed to make realistic career decisions in choosing a program of study. Support services to current students which will assist toward successful completion of their career goals and eventual gainful employment also are available. Heart of Georgia Technical College graduates are eligible for career services regardless of the amount of time since graduation occurred. Available services include:

- Career planning which is designed to equip students with the skills and knowledge they need to make career decisions. Counseling, testing and evaluation resources to help students match their aptitudes, interests and abilities are used to develop career and education goals.
- Career placement is committed to assisting active students and graduates in the pursuit of suitable, rewarding employment. With the combined efforts of the faculty and the administration a cooperative relationship is maintained with business and industry. Career placement services include pre-employment preparation of students and placement and follow-up activities aimed at improving the quality of technical education.
- Assistance with resume and application preparation, interviewing skills, and development of other job search skills. Job boards and computerized job searches identify jobs that are available. Job fairs and recruiters on campus are other ways to assist students and employers in finding job opportunities or qualified employees. Follow-up activities are conducted with former students and employers. Questionnaires are periodically sent to graduates and employers and the data collected assists HGTC in meeting its training objectives and developing up-to-date curricula for its courses of study. The Career Center is located in Room 113 in the W. R. Stewart Building at the main campus.

Special needs counseling and services are available in the TRACS Center to those students with disabling conditions who may need individual educational plans, assistive technology, specialized equipment or books, or referral services. Evaluation and program development services are available through the Georgia Division of Rehabilitation Services. Students who know they need these services should contact the Director of Career Services at (478) 274-7643 or the Special Needs Facilitator at (478) 274-7786.

LIBRARY: Please use one of your best resources—the HGTC library located in Room 110 in Louie Livingston Hall on the Dublin campus. It is a new facility which has study rooms, a computer lab, casual seating, carrels for DVD/CD viewing, a coffee area, a children’s area all in a wireless environment. The library is open from 7:30 a.m. to 8:00 p.m. during the quarter. Please access www.heartofgatech.edu, Library Services link, for hours during quarter breaks. From any computer, students have access 24/7 to electronic resources with a quarterly password provided by their instructors. The friendly and helpful staff are available by phone (478) 275-6593, email www.library@heartofgatehc.edu or FAX (478) 275-6594 during business hours and electronically through the “Ask the Librarian” link (on the left side of the library home page) after hours for information the next day. The library welcomes suggestions for new materials from its patrons.

Evaluation

Evaluation of the student’s achievement of the course objectives will be based on satisfactory completion of all required classroom activities. Grading to be computed as follows:

Unit Exams	50%
Quizzes, Homework and In class assignments	10%
Research paper	10%
Comprehensive final exam	30%

Heart of Georgia Technical College grading system, as stated in the HGTC Student Handbook, is as follows:

A	(90-100) Excellent	GP 4.0
B	(80-89) Good	GP 3.0
C	(70-79) Satisfactory	GP 2.0
D	(60-69) Poor	GP 1.0
F	(59 and lower) Failing	GP 0.0
I	Incomplete	Not computed
W	Withdrew (no grade)	Not computed
WP	Withdrew Passing	Not computed
WF	Withdrew Failing	GP 0.0 (computed)

Courses in degree, diploma, and certificate programs of study (including Radiography) require a grade of “C” or higher in order to satisfy program requirements.

WORK ETHICS: Instruction in the development of good work ethics which aid in job retention and advancement is included in this course. This instruction will include weekly activities on a topic related to work ethics including attendance, character, teamwork, appearance, attitude, productivity, organization, communication, cooperation, and respect. A student is assigned a work ethics grade quarterly in addition to the academic grade for the course. Work Ethics Grade Definitions include:

- 3 Exceeds Expectations
- 2 Meets Expectations
- 1 Needs Improvement
- 0 Unacceptable

Your work ethics grade will be a direct result of your conduct, attendance and performance in class. You are encouraged to be mindful of what you say and what you do in the classroom and clinical setting. Please conduct yourself in a manner that is conducive to learning, being respectful of your fellow classmates, staff technologists and your instructor (s). Students are expected to arrive to class prepared. Bring required texts, calculator (no cell phones), pen and #2 pencils.

If a student sleeps during class, he/she will be counted as absent for that class hour.

COLLEGE POLICIES: Policies that affect all HGTC students can be located in the *Catalog/Student Handbook*, which is issued to all students at orientation. A copy of this publication is posted at www.heartofgatech.edu, click *Current Students* tab, click *Catalog/Student Handbook* link. The web version supersedes all other forms of publications in terms of revisions.

NON-DISCRIMINATION STATEMENT: As set forth in its student catalog, Heart of Georgia Technical College does not discriminate on the basis of race, color, creed, national or ethnic origin, gender, religion, disability, age, political affiliation or belief, veteran status, or citizenship status (except in those special circumstances permitted or mandated by law).

Title IX Coordinator: Director of Career Services, W. R. Stewart Building, Room 113F, (478) 274-7643
 Section 504 Coordinator: Special Needs Facilitator, W. R. Stewart Building, Room 113E, (478) 274-7786

Meetings with the instructor and/or program director:

Please be advised that the instructor will document, using an HGTC anecdotal form, any and all advisory conversations involving the instructor and the student.

Addendums to the syllabus

The instructor reserves the right to submit to the student, in writing, any addendum to the syllabus.

RAD 120 Course Calendar

In reference to the course calendar, any dates for Exams, Quizzes, Projects, Fieldtrips, Guest Lecturers, assignments, etc. are tentative. Every effort will be made to abide by the dates set for progression through the course; however, unforeseen circumstances may prevent this from occurring. In the event the instructor feels that the schedule needs to be amended (due to the instructor's absence or need to spend more lecture time on a particular topic, for example), the student will be informed of the schedule change. Exams may be given before, on, or after the date originally assigned, but always with ample notice.

RAD 120 Course Calendar:

Week of:	Tuesday
1/12	Syllabus and calendar discussion/ Lecture chapter 32 and 33
1/19	Exam 1 over chapters 32 and 33/ Lecture chapter 34
1/26	Exam 2 over chapter 34/ Lecture chapter 35/ Movie/ research assignment
2/2	Exam 3 chapter 35/ Lecture Chapter 36
2/9	Exam Chapter 36/ Lecture chapter 37
2/16	Research paper due/ Lecture chapter 38
2/23	No Class...Try to catch up on sleep from Seminar Trip☺
3/2	Exam over chapters 37 and 38/ Lecture chapter 39
3/9	Exam chapter 39/ Lecture chapter 40/ Register for Spring Classes
3/16	Exam Chapter 40/ MOCK REGISTRY
3/23	FINAL EXAM ☺

Calendar is subject to change with advanced notice.

Please note that each class day we will be working on ODIA and/or challenge questions in preparation for the Registry.

RAD 120
Acknowledgement Statement

I, _____ have received a copy of the course syllabus, course outline

Student's Name (Printed)

and course calendar for RAD 120. I understand it is my responsibility to obtain any information for those days that I am absent from class. *

***By not signing this form, the student is not excluded from following the policies and procedures outlined in this document, the radiology student manual or the campus handbook for Heart of Georgia Technical College. By maintaining your enrollment in this class and at this college, you accept the policies and procedures as written.**

Student's Signature

Date