



**RADIOLOGIC TECHNOLOGY PROGRAM  
RDT 201 RADIATION PROTECTION AND RADIOBIOLOGY  
FALL 2011**

**COURSE DESCRIPTION :**

This course provides students with knowledge of the biologic processes that occur as a result of interaction with ionizing radiation. The fundamentals of radiation protection for personnel, patients and the public are discussed, including structural requirements, personnel monitoring, gonadal shielding and other factors that affect the amount of radiation exposure during diagnostic procedures. *Hours: 26 lecture. Prerequisites: RDT 104 and RDT 154 with grades of "C" or better or permission of the department head. Corequisites: RDT 204, RDT 253 and RDT 256 or permission of the department head. Course fee: \$40. Usually offered in the fall.*

**CREDIT HOURS:** 2 credit hours

**FACULTY:** Karie Solembrino, M.S., R.T. (R) (CT) (ARRT)  
Associate Professor of Radiologic Technology

**CONTACT INFORMATION:** Office AHB 307 H  
Office Telephone number: (410) 572-8741  
Administrative Associate: (410) 572-8740  
[ksolembrino@worwic.edu](mailto:ksolembrino@worwic.edu)  
Access to course instructor through Blackboard

**OFFICE HOURS:** Contact instructor through Blackboard for assistance and specific tutoring services offered in the fall 2011 semester.

**TEXTBOOK:** Statkiewicz Sherer, M. (2011). Radiation protection in medical radiography (6<sup>th</sup> ed.). Mosby, Maryland Heights: MO.  
Statkiewicz Sherer, M. (2011). Radiation protection in medical radiography workbook (6<sup>th</sup> ed.). Mosby, Maryland Heights: MO.

Callaway, W. (2008). Comprehensive Review of Radiography. (5<sup>th</sup> Ed.) Mosby.

**WEBSITES:** Subscription to [www.radrevieweasy.com](http://www.radrevieweasy.com).

**ONLINE COURSE MODULE:** Evolve Online: Radiobiology and Radiation Protection

**OBJECTIVES:**

<b><u>Course Objectives</u></b>	<b><u>Assessment Goals</u></b>	<b><u>Assessment Strategies</u></b>
<p>1. Describe radiation protection methods applied to protect the patient and the Radiologic Technologist.</p> <p>(GEO 1, 2, 3, 4, 5, 6, 7, 8)</p>	<ol style="list-style-type: none"><li>1. Define and explain the cardinal rules of radiation protection.</li><li>2. Define the inverse square law and explain how it is applied.</li><li>3. Explain the objectives of a radiation protection program.</li><li>4. Identify the responsibilities of the RSO and facility as it applies to radiation protection/safety.</li><li>5. Define ALARA and describe its application in the clinical arena.</li><li>6. Provide examples of how radiologic technologists restrict radiation exposure to the patient and themselves.</li><li>7. Describe diagnostic efficacy and the justification for imaging procedures.</li><li>8. Identify the responsibilities of the radiologic technologist in the assurance of radiation safety and protection of patients.</li><li>9. Explain the importance of patient education as it applies to radiation protection.</li><li>10. Explain radiation protection as it applies to the utilization of radioisotopes.</li></ol>	<p>Discussion Questions Mosby Workbook Radreview St. Catherine's Tests Paper Quizzes Chapter Tests Comprehensive Final</p>
<p>2. Describe the different forms of particulate and electromagnetic radiations in terms of energy, sources ionization, and biologic effects.</p> <p>(GEO 1, 2, 3, 5, 7)</p>	<ol style="list-style-type: none"><li>1. Describe forms of particulate radiation in terms of characteristics, ionization, energy, and biologic effects.</li><li>2. Describe forms of electromagnetic radiation in terms of characteristics, ionization, energy, and biologic effects.</li><li>3. Identify natural and man-made radiation sources in terms of energy and annual exposure rates.</li><li>4. Describe the electromagnetic spectrum in terms of energy, wavelength, frequency, and ionization.</li><li>5. Explain the consequences of global or local radiation exposure from nuclear accidents/explosions.</li><li>6. Describe radiation emergencies and the consequence of using radiation as a weapon.</li></ol>	<p>Discussion Questions Mosby Workbook Radreview St. Catherine's Tests Paper Quizzes Chapter Tests Comprehensive Final</p>

<b><u>Course Objectives</u></b>	<b><u>Assessment Goals</u></b>	<b><u>Assessment Strategies</u></b>
<p>3. Explain the interactions of x-radiation with matter and attenuation of the beam according to energy, tissue composition, and pathological conditions.</p> <p>(GEO 1, 2, 3, 5, 7)</p>	<ol style="list-style-type: none"> <li>1. Identify the exposure factors selected by the Radiologic Technologist which affect the occurrence of absorption, scatter, and transmission.</li> <li>2. Define absorption, explain its occurrence in the body, and its impact upon radiation exposure.</li> <li>3. Define scatter, explain its occurrence in the body, its impact upon image quality, and its effect upon occupational exposure.</li> <li>4. Explain attenuation according to the energy of the beam, part thickness, tissue composition, contrast administration, and pathology present.</li> <li>5. Differentiate between primary, secondary, and exit radiation.</li> <li>6. Explain photoelectric absorption, Compton scattering, coherent scattering, pair production and photodisintegration.</li> </ol>	<p>Discussion Questions  Mosby Workbook  Radreview  St. Catherine's Tests  Paper  Quizzes  Chapter Tests  Comprehensive Final</p>
<p>4. Differentiate between radiation quantities and units utilized past and present within the Radiologic Technology profession.</p> <p>(GEO 1, 2, 3, 4, 5, 7)</p>	<ol style="list-style-type: none"> <li>1. Explain the historical evolution of radiation quantities and units.</li> <li>2. Explain the discovery of x-rays.</li> <li>3. Define somatic and genetic biologic effects.</li> <li>4. Differentiate between short-term and long-term somatic biologic effects.</li> <li>5. Explain exposure, absorbed dose and equivalent dose.</li> <li>6. Identify quality factors for different types of ionizing radiation.</li> <li>7. Identify radiation weighting factors for different types and energies of ionizing radiation.</li> <li>8. Identify organ or tissue weighting factors.</li> <li>9. Calculate effective dose, equivalent dose, and conversions of radiation quantity units.</li> <li>10. Define LET and explain its biologic effect.</li> <li>11. Define collective dose equivalent.</li> </ol>	<p>Discussion Questions  Mosby Workbook  Radreview  St. Catherine's Tests  Paper  Quizzes  Chapter Tests  Comprehensive Final</p>
<b><u>Course Objectives</u></b>	<b><u>Assessment Goals</u></b>	<b><u>Assessment Strategies</u></b>

<p>5. Describe radiation monitoring devices and survey instruments in terms of utilization in the clinical facility, energy/types of radiation detected, characteristics, and documentation of exposure.</p> <p>(GEO 1, 3, 5, 7)</p>	<ol style="list-style-type: none"> <li>1. Identify and describe personnel monitoring devices used in the clinical setting.</li> <li>2. Explain the purpose of personnel monitoring devices.</li> <li>3. Describe the placement of personnel monitoring devices.</li> <li>4. Explain the advantages and disadvantages of the various types of personnel monitoring devices.</li> <li>5. Identify and describe radiation survey instruments used for area monitoring.</li> </ol>	<p>Discussion Questions Mosby Workbook Radreview St. Catherine's Tests Paper Quizzes Chapter Tests Comprehensive Final</p>
<p>6. Describe the cell in terms of components, function, division, and composition.</p> <p>(GEO 1, 3, 5, 7)</p>	<ol style="list-style-type: none"> <li>1. Explain the cell's chemical composition.</li> <li>2. Describe the composition of DNA and the role it carries out in the cell.</li> <li>3. Differentiate between organic and inorganic substances.</li> <li>4. Describe the cell structure, its components, and the function of each organelle.</li> <li>5. Differentiate between mitosis and meiosis in terms of purpose and affected cells.</li> <li>6. Identify the stages of mitosis and the function of each stage.</li> </ol>	<p>Discussion Questions Mosby Workbook Radreview St. Catherine's Tests Paper Quizzes Chapter Tests Comprehensive Final</p>
<p>7. Differentiate between the various levels of biologic damage which may occur in living systems, and describe the processes of direct and indirect action as the result of ionizing radiation exposure.</p> <p>(GEO 1, 2, 3, 4, 5, 7)</p>	<ol style="list-style-type: none"> <li>1. Define and explain the following radiation energy transfer determinants: linear energy transfer, relative biologic effectiveness, and oxygen enhancement ratio.</li> <li>2. Differentiate between high-LET and low-LET radiation in terms of characteristics, biologic effects and radiation energy.</li> <li>3. Describe the molecular effects of irradiation.</li> <li>4. Differentiate between direct and indirect action.</li> <li>5. Explain the radiolysis of water.</li> <li>6. Explain the effects of ionizing radiation on DNA.</li> <li>7. Describe the target theory and its effect upon the cell.</li> <li>8. Explain the cellular effects of irradiation.</li> <li>9. Identify radiosensitive cells in the body and explain why the cells have an adverse effect to radiation exposure.</li> <li>10. Explain the implications of whole body versus partial body radiation exposure and the significance of exposure.</li> </ol>	<p>Discussion Questions Mosby Workbook Radreview St. Catherine's Tests Paper Quizzes Chapter Tests Comprehensive Final</p>
<p><b><u>Course Objectives</u></b></p>	<p><b><u>Assessment Goals</u></b></p>	<p><b><u>Assessment Strategies</u></b></p>
<p>8. Differentiate between early and</p>	<p>1. Explain somatic and genetic damage</p>	<p>Discussion Questions</p>

<p>late radiation effects of ionizing radiation on organ systems.</p> <p>(GEO 1, 2, 3, 5, 7)</p>	<p>factors.</p> <ol style="list-style-type: none"> <li>2. Differentiate between nonstochastic and stochastic effects from ionizing radiation.</li> <li>3. Explain the characteristics of acute radiation syndrome and the stages/exposure associated with each.</li> <li>4. Explain the graph which depicts the stages of acute radiation syndrome.</li> <li>5. Describe LD 50/30 and LD 50/60.</li> <li>6. Explain radiation exposure to specific organs/tissues and the biologic effects associated with each.</li> <li>7. Identify and explain radiation dose-response curves and the diseases/categories associated with each.</li> <li>8. Explain threshold and nonthreshold relationships.</li> <li>9. Differentiate between late nonstochastic and late stochastic effects.</li> <li>10. Differentiate between absolute and relative risk models.</li> <li>11. Describe radiation induced cancer in radium watch-dial painters, uranium miners, early medical radiation workers, and atomic bomb survivors.</li> <li>12. Explain the ETHOS project.</li> <li>13. Describe life span shortening studies performed as a result of radiation exposure.</li> <li>14. Explain cataractogenesis as a result of radiation exposure.</li> <li>15. Describe the gestational stages and identify the most radiosensitive stage.</li> <li>16. Identify the causes associated with genetic mutations.</li> <li>17. Define the doubling dose concept and explain its application.</li> </ol>	<p>Mosby Workbook  Radreview  St. Catherine's Tests  Paper  Quizzes  Chapter Tests  Comprehensive Final</p>
<p><b><u>Course Objectives</u></b></p>	<p><b><u>Assessment Goals</u></b></p>	<p><b><u>Assessment Strategies</u></b></p>
<p>9. Explain the dose limits for ionizing radiation exposure and</p>	<p>1. Explain the basis of the effective dose limiting system.</p>	<p>Discussion Questions  Mosby Workbook</p>

<p>the agencies responsible for these recommendations.</p> <p>(GEO 1, 2, 3, 5, 7)</p>	<ol style="list-style-type: none"> <li>2. Identify and describe radiation protection standard organizations.</li> <li>3. Identify and describe the U.S. Regulatory agencies of radiation exposure.</li> <li>4. Explain the radiation control for Health and Safety Act of 1968.</li> <li>5. Explain the consumer-patient radiation health and safety act of 1981.</li> <li>6. Describe the radiation-induced responses of concern in radiation protection.</li> <li>7. Explain the current radiation protection Philosophy.</li> <li>8. Explain the occupational and nonoccupational dose limits.</li> </ol>	<p>Radreview St. Catherine's Tests Paper Quizzes Chapter Tests Comprehensive Final</p>
<p>10. Explain how equipment is designed to ensure radiation protection.</p> <p>(GEO 1, 3, 5, 7)</p>	<ol style="list-style-type: none"> <li>1. Describe radiation safety features of radiographic equipment, devices, and accessories.</li> <li>2. Identify beam limiting devices and the purpose of each accessory.</li> <li>3. Define filtration and identify its purpose, amount, and function in radiographic equipment.</li> <li>4. Identify and provide examples of compensating filters.</li> <li>5. Define and explain the following terms/equipment: exposure reproducibility, exposure linearity, screen-film combinations and radiographic grids.</li> <li>6. Explain the minimal source to skin for mobile and fixed radiography systems.</li> <li>7. Describe the radiation safety features of digital imaging equipment, devices, and accessories.</li> <li>8. Describe radiation safety features of fluoroscopic equipment, devices, and accessories.</li> <li>9. Describe radiation safety features of mobile c-arm fluoroscopy equipment, devices and accessories.</li> <li>10. Describe radiation safety features of cinefluoroscopy, digital fluoroscopy, and high level control interventional procedures equipment.</li> </ol>	<p>Discussion Questions Mosby Workbook Radreview St. Catherine's Tests Paper Quizzes Chapter Tests Comprehensive Final</p>
<p><b><u>Course Objectives</u></b></p>	<p><b><u>Assessment Goals</u></b></p>	<p><b><u>Assessment Strategies</u></b></p>
<p>11. Explained how patient radiation dose is managed during diagnostic x-ray</p>	<ol style="list-style-type: none"> <li>1. Explain the importance of effective communication to reduce patient radiation exposure.</li> </ol>	<p>Discussion Questions Mosby Workbook Radreview</p>

<p>procedures. (GEO 1, 2, 3, 4, 5, 7)</p>	<ol style="list-style-type: none"> <li>2. Identify immobilization devices and specific examples when they are applied.</li> <li>3. Describe shielding devices and explain when each type is used.</li> <li>4. Describe how technical exposure factors are used to reduce patient radiation exposure.</li> <li>5. Identify common errors resulting in repeat radiographs and methods of prevention.</li> <li>6. Define and explain the following terms: ESE, skin dose, gonadal dose, GSD, and bone marrow dose.</li> <li>7. Explain the methods to prevent exposure to the pregnant patient.</li> <li>8. Explain radiation exposure to patients in various imaging modalities.</li> <li>9. Explain pediatric considerations in diagnostic imaging to prevent excess exposure to ionizing radiation.</li> </ol>	<p>St. Catherine's Tests Paper Quizzes Chapter Tests Comprehensive Final</p>
<p>12. Explain how radiation dose is managed for imaging personnel. (GEO 1, 2, 3, 4, 5, 7)</p>	<ol style="list-style-type: none"> <li>1. Describe dose reduction methods for the occupationally exposed.</li> <li>2. Explain the protection for pregnant Radiologic Technologists.</li> <li>3. Explain how the cardinal rules of radiation protection are applied for the reduction of exposure to the Radiologic Technologist.</li> <li>4. Identify the types of primary and secondary barriers for radiation protection.</li> <li>5. Explain the protection of personnel during fluoroscopic examinations.</li> <li>6. Explain the protection of personnel during mobile radiographic examinations.</li> <li>7. Explain the design of the diagnostic x-ray suite.</li> </ol>	<p>Discussion Questions Mosby Workbook Radreview St. Catherine's Tests Paper Quizzes Chapter Tests Comprehensive Final</p>

**COURSE CONTENT:**

1. Explain radiation protection methods utilized by the technologist to reduce occupational exposure dose.

2. Explain radiation protection methods utilized to reduce radiation dose to the patient.
3. Identify radiation monitoring devices, their uses, and importance in the tracking of radiation dose and radiation presence within a healthcare facility.
4. Describe early effects of ionizing radiation exposure.
5. Describe late effects of ionizing radiation exposure.
6. Differentiate between ionizing and nonionizing radiation on the electromagnetic spectrum and identify the properties of each.
7. Explain the construction of x-ray equipment to prevent unnecessary radiation exposure and the safety mechanisms to maintain ALARA.
8. Define the units of measurement for radiation exposure, radiation absorbed dose, occupational exposure, and radioactivity.
9. Evaluate exposure factors for image quality and patient dose.
10. Identify areas where potential radiation exposure is the greatest for the Radiologic Technologist.
11. Identify methods to protect the pregnant patient, describe the gestational period in terms of radiosensitivity, and radiation exposure limitations monthly/for the entire gestational period.
12. Describe shielding methods and explain the application for each type of shield.
13. Explain beam attenuation in terms of energy, tissue thickness, and pathology present.
14. Differentiate between primary, secondary, and exit radiation.
15. Identify the parts of the cell and function of each component.
16. Describe the effects of radiation exposure to cellular and molecular components.
17. Explain the occupational and nonoccupational dose exposure limits.
18. Differentiate between primary and secondary barriers and their location within the Radiologic Technology department.
19. Identify organizations responsible for radiation protection for the occupationally and nonoccupationally exposed individuals.
20. Differentiate between nonstochastic and stochastic characteristics.
21. Explain the purpose of a radiation protection program within medical facilities and the role of the Radiation Safety officer.
22. Identify radiation quality factors, weighting factors, and tissue factors according to the type of radiation absorbed dose.

**The RDT course content reflects the American Society of Radiologic Technologists (ASRT) Radiography curriculum, the American Registry of Radiologic Technologists (ARRT) Licensure examination requirements, and the master plan of education enforced by the Joint Review Committee on Education in Radiologic Sciences (JRCERT).**

### **ACADEMIC HONESTY POLICY**

Students found exhibiting any of the following types of behavior during or in the preparation/performance of any quiz, project, report, test, or final exam will receive a zero "0" for the assignment, and the student conduct violation will be referred to the Student-Faculty Disciplinary Committee. Cheating will not be tolerated in the Radiologic Technology program.

Students found cheating will be DISMISSED from the Radiologic Technology program.

- A. Cheating is defined as the act of obtaining information or data improperly or by dishonest or deceitful means; and
- B. Plagiarism is defined as the copying or imitating the language, ideas, or thoughts of another author and presenting them as one's original work, the copying of a theme or section from a book or magazine without giving credit in a footnote or copying from the manuscript of another student.

Sharing information present on a quiz or test are examples of academic dishonesty and will result in a grade of "F" for the course and immediate dismissal from the Radiologic Technology program.

### **RECOMMENDED MATERIALS FOR ONLINE COURSE COMPLETION**

#### **Materials:**

- A computer with Windows XP or greater and access to the Internet (or compatible operating system).
- Microsoft Office 2000 Word or greater (Not Microsoft Works or Word Perfect).
- Microsoft Internet 6.0 or greater.

#### **Skills:**

- Basic knowledge of Internet and computers.
- Know how to send and receive attachments through email.
- Be able to work independently and motivated to complete assignments on a timely basis.

**College computer access is provided if students do not have access to a computer system at home. Please refer to [www.worwic.edu](http://www.worwic.edu) to locate media center hours in each of the respective buildings on campus.**

### **ONLINE COURSE ORIENTATION**

Monday August 15, 2011 9:00 am to 11:00 am in AHB 303. The following will be reviewed in the RDT 201 Online course orientation: (1) Blackboard components, (2) Netiquette, (3) Assignments required for the course/assignment submission, (4) Exam/Quiz completion, (5) Class Guidelines/Expectations, (6) Course materials, (7) Listening to lectures presented through PowerPoint, (8) Contacting course instructor, and (8) Tutoring services provided for the course. Students are encouraged to contact the course instructor with any questions regarding the online course orientation.

### **ONLINE CLASS GUIDELINES**

This class is a combination of text material, assignments, examinations, and participation in online class discussions. Material is presented through the textbook and within Blackboard. Active participation in the online course room is expected. In addition, the instructor will

provide online assistance through the course chat room and tutoring services on campus.

**Assignments must be submitted by the due dates/times outlined within the course syllabus. Assignments are a requirement. Therefore, failure to submit any assignment by the due date/time will result in a 0 for the assignment and 5% deduction from the course final grade for each infraction. There are no exceptions to this policy.**

**Example:**

Student does not turn in discussion questions for a week = 0 and 5% deduction.

Same student does not turn in registry review assignment = 0 and another 5% deduction.

The student would receive two zeros and a total of 10% off of the course final grade for failure to submit two assignments.

Technology is not always reliable; therefore, count on problems with computers, and plan your assignments and exams accordingly. Since all communication for this course is written, it is essential that proper writing practices are used for email as well as discussion postings:

- Emails begin with a salutation and end with a closing.
- Sentences begin with a capital letter, and end with a period.
- Proper paragraphing should be used.
- Only complete sentences should be used unless presenting a list.

Text messaging shortcuts may not be used. Students are expected to use spell check to ensure accuracy of communications submitted through the online course environment.

**COMMUNICATION WITH INSTRUCTOR**

Students are encouraged to contact the course instructor with questions regarding online expectations, assignments, and didactic content. **The most effective method to contact the course instructor is through email in Blackboard.** The instructor will logon to Blackboard multiple times daily to answer questions and provide clarification to course contact. If the student

needs to verbally speak to the course instructor, please leave a contact number in the email. All emails will be answered within 24-hours by the course instructor.

During the time period when the instructor is off-campus, students may use text messaging to contact the course instructor between the hours of **10 am to 6 pm** daily for quick questions which can be easily addressed via this communication method.

If for any reason a student is unable to reach the course instructor, call the RDT Administrative Associate Amy Brown at (410) 572-8741 and she will obtain immediate contact with the course instructor and relay your message/question.

**INSTRUCTIONAL MATERIALS**

The following are instructional materials which will be utilized for RDT 201: (1) Assigned

Textbook, (2) Workbook, (3) Links to websites, (4) Online course modules, (5) References to additional textbooks, and (6) PowerPoint Presentations.

**Online course modules must be viewed using FIREFOX.** Student may have difficulty viewing online course modules when using Internet Explorer.

The workbook is used in conjunction with the textbook to assist students with the mastery of course content. **Students are not required to submit workbooks to the course instructor for a grade.**

### **BLACKBOARD COMPONENTS**

The following are tools the course instructor will be using in Blackboard:

**Syllabus:** The posted course syllabus documents the didactic schedule, assignments, due dates, and information pertinent to the course.

**Messages:** Email from the course instructor will be located under the messages section of Blackboard. Students may email the instructor and other students in the class through messages. Email is the method of communication between students and the course instructor. Students should visit the messages section daily in the course for new information sent by the instructor.

**Course Content:** The following items will be located within the course content of Blackboard: (1) PowerPoint Presentations, (2) Quizzes, (3) Study Guides and Reviews, and Assignment information. Content folders will be labeled by the dates/weeks in the semester to organize course material.

**Grades:** Students can view grades in Blackboard. All graded assessments will be recorded into Blackboard.

**Discussions:** Students are required to answer discussion questions posted in Blackboard. The purpose of the discussion questions is to assist the student in mastering course objectives.

### **CLASS GUIDELINES/EXPECTATIONS**

The semester is broken down into weeks. **Each week begins on Monday and ends on Sunday.** All course assignments submitted through Blackboard are due at midnight on Sunday nights. Projects and/or assignments which cannot be submitted through Blackboard are due by 4:30 pm to the RDT department on campus.

Students are required to thoroughly complete all assignments/activities. No incomplete or half-attempted work will be accepted. Refer to the course assignment section of the syllabus for due dates, times, and required criteria for each assignment.

Online courses require students to exhibit increased motivation to stay on track and complete all required activities. It is the student's responsibility to complete all assigned work. Students are encouraged to read emails and reminders submitted weekly from course instructor.

Contact course instructor with questions/clarification on online course content in enough time to successfully complete each required assignment.

Student will have access to one week at a time in Blackboard. Content will be made available according to the topics reviewed in the syllabus. Once content has been made available to the student, it will remain in the student's view for the entire semester.

### **FALL 2011 RDT TUTORING**

Tutoring for RDT 201 will occur when the course instructor returns to campus. Tutoring dates and times will be communicated through Blackboard. **Students are required to notify the course instructor of attendance to tutoring sessions through Blackboard.** Tutoring sessions will be cancelled if student attendance is not confirmed.

### **RADBIO/RADIATION PROTECTION REGISTRY REVIEW WORKBOOK**

(GEO 1, 2, 3, 4, 5, 7) (CO 1-12)

Students will complete the Radiation Protection/Radbio section of the Mosby's Comprehensive Registry Review Workbook. **Failure to submit the registry review workbook assignment will result in a 0 for the assignment and 5% off of the RDT 201 Radiation Protection and Radiobiology course final grade. NO LATE ASSIGNMENTS WILL BE ACCEPTED. Failure to follow directions will result in a grade of 0 for the assignment.**

#### **Review of Radiation Protection/Radiobiology Chapter 2 Pages 21-46**

Read the review of radiation protection/radiobiology. Complete questions 1-100. Type your answers in a Microsoft Word compatible document. **HIGHLIGHT IN RED** the questions you answered incorrectly. Document your score (ex: 90/100). Identify and document four specific areas you need to review and how you plan to improve in the areas identified.

**The Mosby's Radiation Protection Registry Review Workbook Assignment is due Sunday November 6, 2011 at 12:00 am midnight through Blackboard. Send the assignment as an attachment through an email message.**

### **DISCUSSION QUESTIONS** (GEO 1, 2, 3, 7) (CO 1-12)

Students will answer discussion questions posted in Blackboard. The purpose of the discussion questions are to provide students the opportunity to apply course objectives. To access these questions, click on discussions. Click on the question/assignment posted by the course instructor and select reply. Follow the discussion question rubric located in the course syllabus for grading criteria. Discussion question posts are due on Sundays each week at 12:00 am midnight.

**Failure to submit discussion questions by the due dates/times will result in a grade of 0 and 5% deducted from the RDT 201 final course grade. NO LATE ASSIGNMENTS WILL BE ACCEPTED.**

### **RADREVIEW EASY REGISTRY REVIEW** (GEO 1, 2, 3, 4, 5, 7) (CO 1-12)

Students will complete radiation protection/radiobiology registry review tests in the [www.radrevieweasy](http://www.radrevieweasy) website. The score received is the score earned. **Students must score a minimum of 80% on each radiation protection/radiobiology registry review test.** Students are not permitted to submit scores less than an 80%. **Scores submitted less than a 80% will receive a grade of 0 for the assignment. Students must complete in TEST MODE.**

#### **Follow these directions when completing the radreview Radiation Protection Questions:**

1. Specify Exam Mode = Select "Exam Mode"
2. Specify Question Type = "All Questions"
3. Specify Exam Options = "I want to specify one or more specialties to include on this exam"
  - Check box and select Comprehensive Radiation Protection
  - Should check all of the boxes under the heading
4. Select how many questions = **Select 150 Questions each time you take the test**

**Radreview easy assignments are due at 12:00 am midnight on the due date.** Students are required to email the instructor through Blackboard the scores earned, the date the assignment was completed, and username/password to review scores for credit.

**Failure to submit the Radreview assignments will result in a 0 for the assignment and 5% off of the RDT 201 Radiation Protection and Radiobiology course final grade. NO LATE ASSIGNMENTS WILL BE ACCEPTED. Failure to follow directions will result in a grade of 0 for the assignment.**

### **ST. CATHERINE REGISTRY REVIEW TESTS** (GEO 1, 2, 3, 4, 5, 7) (CO 1-12)

The St. Catherine registry review tests provide students with a comprehensive review of the Radiologic Technology curriculum. Students will complete the registry review tests in the **WWCC testing center.** No textbooks, notes, or references are permitted. **Students will be given full credit for the completion of the assignment provided the score is 60 or higher.** Students earning 80 or higher on the St. Catherine registry review tests will be given 3 points extra credit to be applied to the lowest quiz grade in the semester (possible 6 extra credit points/3 points per test). The student will complete two St. Catherine registry review tests for the RDT 201 course. **The St. Catherine Review Tests are due Saturday December 3, 2011 at 4:30 pm.** St. Catherine tests can be completed early. The tests will be available in the testing center.

**Failure to complete the St. Catherine Registry Review Tests will result in a 0 for the assignment and 5% off of the RDT 201 Radiation Protection and Radiobiology course final grade. TESTS COMPLETED LATE WILL NOT BE ACCEPTED. Failure to follow directions will result in a grade of 0 for the assignment.**

### **WWCC TESTING CENTER**

RDT students will complete St. Catherine Registry Review Tests for RDT 201 and chapter tests in the WWCC Testing Center. According to the testing center policies, students must do the

following when entering the center to complete a test or quiz:

1. Present a current school or government-issued photo ID.
2. Provide the name of the instructor teaching the course.
3. Provide the course name and section number.
4. Identify the name of the test.
5. Turn off cell phones and any electronic devices.

The testing center maintains a roster of students completing each RDT test and will document date and time the student enters and exits the testing center. Students will be given two hours to complete each St. Catherine Test.

**Students will be provided additional information/instructions about the St. Catherine Registry Review tests before the due dates.**

**The testing center is located in AAB 226. The following are the hours of operation for the testing center:**

Sundays	Closed
Mondays	10:00 am to 8:00 pm
Tuesdays	10:00 am to 8:00 pm
Wednesdays	10:00 am to 8:00 pm
Thursdays	10:00 am to 8:00 pm
Fridays	10:00 am to 3:00 pm
Saturdays	12:00 pm to 5:00 pm

Students are required to plan accordingly to complete tests and assignments based upon the testing center schedule.

### **ELECTRONIC/INFORMATION LITERACY WRITING ASSIGNMENT**

(GEO 1, 2, 3, 5, 7) (CO 1-12)

The student will choose an electronic journal article or an article in an educational website for the Electronic information literacy RDT 201 writing assignment. The paper should include the following components:

1. **Summary of the article using a minimum of five APA formatted citations.**
2. **Explanation of three substantiated lessons learned through the conduction of research.**
3. **Rationale for choosing the topic.**
4. **Correlation of the topic selected to course learning objectives through the documentation of specific examples.**

The student will research the topic for electronic resources in the WWCC database and on the World Wide Web. **WIKIPEDIA IS NOT AN ACCEPTABLE RESOURCE.** Students will provide a minimum of one electronic resource relevant to this topic and write a 1000 word minimum and 1500 word maximum, double-spaced paper. The paper should include a cover page and a works cited page (this is not part of the 1000 word requirement). Students are to follow APA format for citations which should be included throughout the writing assignment. Refer to the grading rubric for the writing assignment evaluation criteria.

The Electronic/Information Literacy writing assignment is **Due Sunday October 2, 2011 by 12:00 am (midnight) EST** as an attachment in messages of Blackboard. **NO LATE PAPERS WILL BE ACCEPTED. FAILURE TO SUBMIT THE PAPER BY Sunday October 2, 2011 12:00 am EST WILL EARN A 0.**

**The following are considered appropriate topics for the RDT 201 Paper:**

1. Patient Dose/Occupational Dose attributed to specific imaging procedures
2. Image Gently
3. Image Wisely
4. Pediatric Dose Considerations
5. Imaging the pregnant patient
6. Radiation induced Cancer
7. Chernobyl/Radiation Accidents
8. Any method to exercise Radiation Protection for the Patient and/or Technologist
9. Topics regarding background radiation exposure

**The following is a list of Radiologic Technology electronic resources which may be used for the RDT 201 Paper:**

1. <http://www.appliedradiology.com/>
2. <http://www.auntminnie.com/index.aspx?sec=def>
3. <http://www.diagnosticimaging.com/home>
4. <http://www.medscape.com/radiology/journals>

5. <http://www.radiologyinfo.org/>
6. <http://www.radiologytoday.net/>
7. <http://www.rtstudents.com/>
8. <https://www.arrt.org/>
9. <https://www.asrt.org/>

**The Electronic/Information Literacy assignment is a college requirement. Students who fail to submit the paper or do not submit by the due date will receive a 0 for the assignment and a 5% deduction from the RDT 201 Radiation Protection and Radiobiology course final grade.**

If you wish to have additional help on an essay, you may schedule an appointment with a writing conference instructor by going to [www.worwic.edu](http://www.worwic.edu) and clicking on “Current Students” and then “Learning Resources” and “Writing Conferences.” Limited time slots are available, so an appointment is required. If you cannot keep your appointment, it is your responsibility to cancel any writing conferences by using this link. Writing Conferences are located in AAB 216.

Writing

Conferences hours are:

Mondays	3:00-6:00 pm
Tuesdays	3:00-6:00 pm
Wednesdays	11:00 am-2:00 pm

**Students may submit a completed draft paper to the course instructor two weeks before the scheduled due date for suggestions/feedback. Papers must have citations, a works cited page, title page, and exhibit APA format for evaluation. The course instructor will not provide feedback on any incomplete paper draft. Students are permitted one review of the paper before submission. Writing assignments which do not include all paper components will not be reviewed in draft form by the course instructor. Paper drafts will not be evaluated by the course instructor before the start of the fall semester.**

**Students are required to submit the electronic information literacy assignment in a digital format through blackboard. The paper must be submitted in a Microsoft Word compatible document. Papers will not be accepted in hard copy form.**

**QUIZZES** (GEO 1, 2, 3, 4, 5, 7) (CO 1-12)

Quizzes will be administered throughout the semester to measure the student’s comprehensive knowledge of course concepts. Students may complete quizzes at home or on campus. All quizzes have a 15-minute time limit. Quizzes will be administered through Blackboard. **NO MAKE-UP QUIZZES WILL BE ADMINISTERED. FAILURE TO COMPLETE ANY QUIZ WITHIN**

**THE DATES/TIMES AVAILABLE WILL RESULT IN A GRADE OF 0 FOR THE QUIZ.**

**TESTS** (GEO 1, 2, 3, 4, 5, 7) (CO 1-12)

Chapter tests will be administered throughout the semester. Three tests will be administered in RDT 201. Tests are completed in the testing center and are in a paper/pencil format. All tests have a 3-hour time limit. **NO MAKE-UP TESTS WILL BE ADMINISTERED. STUDENTS ARE REQUIRED TO COMPLETE TESTS AT THE TESTING CENTER DURING THE DATES/TIMES AVAILABLE. FAILURE TO COMPLETE ANY TEST WITHIN THE DATES/TIMES AVAILABLE WILL RESULT IN A GRADE OF 0 FOR THE TEST.**

**COMPREHENSIVE FINAL EXAMINATION** (GEO 1, 2, 3, 4, 5, 7) (CO 1-12)

The comprehensive final examination will cover all radiation protection/radiobiology topics reviewed throughout the semester. The comprehensive final examination will be administered in a paper/pencil format on Monday December 12, 2011. **NO MAKE-UP FINAL WILL BE ADMINISTERED.**

**EMERGENCY INFORMATION:**

In the event of a flu epidemic or other emergency that results in the suspension of classes, faculty will be communicating with students about their courses and course requirements, such as assignments, quiz and exam dates, and class and grading policies, via faculty websites or Blackboard. Students will be responsible for completing all these assignments in accordance with class policies. Information about the resumption of classes will be communicated via the College's website and email system.

**RDT students are responsible for all assignments and due dates outlined in the course syllabus regardless if the college has been closed due to an emergency.**

**COURSE EVALUATION**

Assignments	10%
- Discussion Questions	
- Mosby Workbook	
- St. Catherine Tests	
- Paper	

- Radreview Tests

Quizzes	10%
Tests	30%
Comprehensive Final	50%

**GRADING SCALE**

A	93-100
B	84-92
C	75-83
D	66-74
F	0-65

**A FINAL GRADE BELOW A 75.0% RESULTS IN COURSE FAILURE AND DISMISSAL FROM THE RADIOLOGIC TECHNOLOGY PROGRAM. GRADES ARE NOT ROUNDED. A FINAL GRADE OF 74.9% WILL RESULT IN COURSE FAILURE AND DISMISSAL FROM THE RADIOLOGIC TECHNOLOGY PROGRAM.**

**Discussion Post Grading Rubric**

<b>Criteria (10 Total Points)</b>	<b>0 Non-performance</b>	<b>1 Basic</b>	<b>2 Proficient</b>
<b>Spelling</b>	Three or more spelling errors in the discussion post.	One to two spelling errors are present in discussion post	Discussion post is free of spelling errors.
<b>Grammar/Sentence Structure</b>	Three or more grammatical and/or sentence structure errors in the discussion post.	One to two grammatical/ sentence structure errors present in the discussion post.	Discussion post is free of grammatical or sentence structure errors.
<b>Length</b>	Discussion post is less than 300 words.		Discussion post adheres to the 300 word length requirement.
<b>Summarize electronic article and explain relevance of article to course objectives.</b>	Does not provide adequate summary of article and/or provide relevance of article to course objectives.		Summarizes the electronic article and explains relevance of article to course objectives.
<b>Lessons Learned</b>	Does not explain two lessons learned.		Explain two lessons learned from the electronic article.

**RDT 201 Electronic Information Literacy Radiation Protection Paper Grading Rubric**

<b>Criteria (24 Total Points)</b>	<b>0 Non-performance</b>	<b>2 Basic</b>	<b>3 Proficient</b>
<b>Spelling</b>	More than three spelling errors are present throughout the paper.	No more than three spelling errors are present.	Paper is free of spelling errors.
<b>Grammar/Sentence</b>	Does not demonstrate	No more than three	Paper is free of grammatical and

<b>Structure</b>	coherent sentence structure or knowledge of grammatical rules as expressed in the English Language.	Grammatical or Sentence structure errors are noted.	sentence structure errors. Language is concise and easily understood by the reader.
<b>Length</b>	Paper has less than 1000 words.		Paper has a minimum of 1000 words. The word count DOES NOT include the title or works cited page This is CONTENT only.
<b>Content</b>	Does not summarize the article using a minimum of five APA formatted citations. The correlation of the article with radiation protection/radiobiology learning objectives is not clearly defined and/or examples not provided.	.	Summarizes the article with a minimum of five APA formatted citations. Explains the importance of the article to radiation protection/radiobiology learning objectives by providing a minimum of three specific examples.
<b>Explains rationale for choosing topic.</b>	Does not explain rationale for choosing topic.		Explains rationale for choosing topic by documenting a correlation between topic and content covered in lecture.
<b>Describes lessons learned.</b>	Does not describe lessons learned and/or describes less than three specific lessons learned from the article.		Describes a minimum of three specific lessons learned from the article.
<b>Works cited in APA Format</b>	Does not provide reference in APA format.		Electronic resource provided in APA format.
<b>Paper Components</b>	Paper does not include a title page, 1000 words of content, and works cited page.		Paper includes a title page, a minimum of 1000 words of content, and a works cited page.

### RDT 201: Radiation Protection and Radiobiology

<u><b>DATES</b></u>	<u><b>COURSE WORK</b></u>	<u><b>ASSIGNMENTS</b></u> <u><b>ASSESSMENTS</b></u>	<u><b>DUE DATES</b></u>
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<b>WK 1</b> <b>Sept 7 – Sept 11</b>	Read Chapter 1 Introduction to Radiation Protection  Review PowerPoint Presentation Chapter 1 Notes	Discussion Question Post – Chernobyl  Chapter 1 Workbook	<b>DQ Post</b> <b>Due 9/11/11</b> <b>12:00 am EST</b>
<b>WK 2</b> <b>Sept 12 – Sept 18</b>	Read Chapter 2 Interaction of X Radiation with Matter  Review PowerPoint Presentation Chapter 2 Notes  Evolve Online Module 2 Radiation Interactions with Matter	Discussion Question Post – Three Mile Island  <b>Quiz 1</b> <b>Chapter 1</b>  Chapter 2 Workbook	<b>DQ Post</b> <b>Due 9/18/11</b> <b>12:00 am EST</b>  <b>Quiz 1</b> Available 9/12/11 and due 9/18/11 at 12:00 am midnight EST
<b>WK 3</b> <b>Sept 19 – Sept 25</b>	Read Chapter 3 Radiation Quantities and Units  Review PowerPoint Presentation Chapter 3 Notes	Discussion Question Post – Effects of Radiation Exposure  <b>Quiz 2</b> <b>Chapter 2</b>  Chapter 3 Workbook	<b>DQ Post</b> <b>Due 9/25/11</b> <b>12:00 am EST</b>  <b>Quiz 2</b> Available 9/19/11 and due 9/25/11 at 12:00 am midnight EST
<b>WK 4</b> <b>Sept 26 – Oct 2</b>	Read Chapter 4 Radiation Monitoring  Review PowerPoint Presentation Chapter 4 Notes  Evolve Online Module 5 Radiation Detection and Measurement	Paper  Chapter 4 Workbook  <b>Quiz 3</b> <b>Chapter 3</b>	<b>Paper</b> <b>Due 10/2/11</b> <b>12:00 am EST</b>  <b>Quiz 3</b> Available 9/26/11 and due 10/2/11 at 12:00 am midnight EST
<b>WK 5</b> <b>Oct 3 – Oct 9</b>	<b>TEST REVIEW</b>	<b>TEST ONE</b>	<b>TEST ONE</b> <u>Available 10/3/11 at 10:00 am until 10/5/11 at 8:00 pm.</u>
<b><u>DATES</u></b>	<b><u>COURSE WORK</u></b>	<b><u>ASSIGNMENTS</u></b> <b><u>ASSESSMENTS</u></b>	<b><u>DUE DATES</u></b>

<b>WK 6</b>  <b>Oct 10 – Oct 16</b>	Read Chapter 5 Overview of Cell Biology  Review PowerPoint Presentation Chapter 5 Notes  Evolve Online Module 1 Introduction to Cell Biology	Discussion Question Post – Radiation Exposure and Thyroid Cancer  Chapter 5 Workbook	<b>DQ Post</b> <b>Due 10/16/11</b> <b>12:00 am EST</b>
<b>WK 7</b>  <b>Oct 17 – Oct 23</b>	Read Chapter 6 Molecular and Cellular Radiation Biology  Review PowerPoint Presentation Chapter 6 Notes  Evolve Online Module 3 Systemic Radiation Effects	Chapter 6 Workbook  <b>Quiz 4</b> <b>Chapter 6</b>	<b>Quiz 4</b> <b>Available 10/17/11 and</b> <b>due 10/23/11 at 12:00 am</b> <b>midnight EST</b>
<b>WK 8</b>  <b>Oct 24 – Oct 30</b>	Read Chapter 7 Early Radiation Effects on Organ Systems  Review PowerPoint Presentation Chapter 7 Notes  Evolve Online Module 3 Systemic Radiation Effects	Discussion Question Post – Risk of Cancer in Middle Aged Patients  Chapter 7 Workbook  <b>Quiz 5</b> <b>Chapter 7</b>	<b>DQ Post</b> <b>Due 10/30/11</b> <b>12:00 am EST</b>  <b>Quiz 5</b> <b>Available 10/24/11 and</b> <b>due 10/30/11 at 12:00 am</b> <b>midnight EST</b>
<b>WK 9</b>  <b>Oct 31 – Nov 6</b>	Read Chapter 8 Late Radiation Effects on Organ Systems  Review PowerPoint Presentation Chapter 8 Notes  Evolve Online Module 4 Effects of Radiation on the Human Body	Mosby’s WKBK  Radreview Easy (150) Questions Radiation Protection  Chapter 8 Workbook  <b>Quiz 6</b> <b>Chapter 8</b>	<b>Mosby’s WKBK</b> <b>Due 11/6/11</b> <b>12:00 am EST</b>  <b>(150) Radreview</b> <b>Questions</b> <b>Due 11/6/11</b> <b>12:00 am EST</b>  <b>Quiz 6</b> <b>Available 10/31/11 and</b> <b>due 11/6/11 at 12:00 am</b> <b>midnight EST</b>
<u><b>DATES</b></u>	<u><b>COURSE WORK</b></u>	<u><b>ASSIGNMENTS</b></u> <u><b>ASSESSMENTS</b></u>	<u><b>DUE DATES</b></u>

<b>WK 10</b> Nov 7 – Nov 13	<b>TEST REVIEW</b>	<b>TEST TWO</b>	<b>TEST TWO</b> <u>Available Nov 7, 2011 at 10:00 am until Nov 9, 2011 at 8:00 pm.</u>
<b>WK 11</b> Nov 14 – Nov 20	Read Chapter 9 Dose Limits For Exposure to Ionizing Radiation  Review PowerPoint Presentation Chapter 9 Notes	Radreview Easy (150) Questions Radiation Protection  Chapter 9 Workbook	<b>(150) Radreview Questions</b> <b>Due 11/20/11</b> <b>12:00 am EST</b>
<b>WK 12</b> Nov 21 – Nov 27	Read Chapter 10 Equipment Design for Radiation Protection  Review PowerPoint Presentation Chapter 10 Notes  Evolve Online Module 6 Patient Protection Practices and Equipment	Radreview Easy (150) Questions Radiation Protection  Chapter 10 Workbook	<b>(150) Radreview Questions</b> <b>Due 11/27/11</b> <b>12:00 am EST</b>
<b>WK 13</b> Nov 28 – Dec 4	Read Chapter 11 Management of Patient Radiation Dose  Read Chapter 12 Management of Imaging Personnel Radiation Dose  Review PowerPoint Presentation Chapters 11 and 12 Notes  Evolve Online Module 7 Radiographer Protection	(2) St. Catherine Tests  Chapter 11 Workbook	<b>(2) St. Catherine Tests</b> <b>Due 12/3/11</b> <b>5:00 pm EST</b>
<b>WK 14</b> Dec 5 – Dec 11	<b>TEST REVIEW</b>	<b>TEST THREE</b>	<b>TEST THREE</b> <u>Available Dec 5, 2011 at 10:00 am until Dec 7, 2011 at 8:00 pm.</u>
Dec 12, 2011	<b>Comprehensive Final Examination</b>		