SYLLABUS
RDT 201: Radiation Protection and Radiobiology
(2 Credits)

RDT 201 D01
Fall 2016
Instructor: Karie Solembrino, M.S., R.T. (R)(CT)(ARRT)
Department Head and Professor of Radiologic Technology

Class Times:
Lecture: Mondays, 9:00 am – 11:00 am
Office Hours:
Tuesdays 9:00 am to 11:00 am
Thursdays 9:00 am to 11:00 am
Fridays 9:00 am to 10:00 am
Additional hours by appointment

Office: AHB 307H
Phone: 410-572-8741
Email: ksolembrino@worwic.edu

Text

Course Access Code
Mosby’s Radiography Online Radiation Protection in Medical Radiography, 7th Edition

Online Modules
Students are required to subscribe to www.radrevieweasy.com in preparation for the ARRT licensure examination.
Students are required to subscribe to www.radtutor.com.

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. Course fee: $40. Usually offered in the fall.
### Course Objectives

<table>
<thead>
<tr>
<th>Course Objectives</th>
<th>Assessment Goals</th>
<th>Assessment Strategies</th>
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<tbody>
<tr>
<td>1. Describe radiation protection methods designed to limit the patient and the</td>
<td>1. Define and explain the cardinal rules of radiation protection.</td>
<td>• Assignments</td>
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<td>radiologic technologist exposure to ionizing radiation.</td>
<td>2. Define the inverse square law and explain how it is applied.</td>
<td>• Quizzes</td>
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<td>(GEO 1, 2, 3, 7, 8)</td>
<td>3. Explain the objectives of a radiation protection program.</td>
<td>• Tests</td>
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<td>4. Identify the responsibilities of the RSO and facility as it applies to radiation</td>
<td>• Final Examination</td>
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<tr>
<td></td>
<td>protection/safety.</td>
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<td>5. Define ALARA and describe its application in the clinical arena.</td>
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<td>6. Provide examples of how radiologic technologists restrict radiation exposure</td>
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<td>to the patient and themselves.</td>
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<td></td>
<td>7. Describe diagnostic efficacy and the justification for imaging procedures.</td>
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<td>8. Identify the responsibilities of the radiologic technologist in the assurance of</td>
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<td>radiation safety and protection of patients.</td>
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<td>9. Explain the importance of patient education as it applies to radiation</td>
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<td>protection.</td>
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<td>10. Explain radiation protection as it applies to the utilization of radioisotopes.</td>
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<td>11. Explain how radiation dose is managed for imaging personnel.</td>
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<td>12. Explain diagnostic efficacy and its pertinence to radiation protection.</td>
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<td>13. Explain how patient radiation dose is managed during diagnostic x-ray</td>
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<td>procedures.</td>
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<td>14. Explain the dose limits for ionizing radiation exposure and the agencies</td>
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<td>responsible for these recommendations.</td>
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<td>15. Differentiate between occupational and nonoccupational dose limits.</td>
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<td>16. Explain the basis of the effective dose limiting system.</td>
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<td>19. Define and explain the following terms: ESE, skin dose, gonadal dose, GSD,</td>
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<td></td>
<td>and bone marrow dose.</td>
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<td>20. Explain pediatric considerations in diagnostic imaging to prevent excess</td>
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<td>exposure to ionizing radiation.</td>
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<td>2. Describe the different forms of particulate and electromagnetic radiations in</td>
<td>1. Describe forms of particulate radiation in terms of characteristics, ionization,</td>
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<td>terms of energy, measurement, and ability to induce biologic effects.</td>
<td>energy, and biologic effects.</td>
<td>• Assignments</td>
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<td>(GEO 1, 2, 3, 4, 7)</td>
<td>2. Describe forms of electromagnetic radiation in terms of characteristics,</td>
<td>• Quizzes</td>
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<td>ionization, energy, and biologic effects.</td>
<td>• Tests</td>
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<td></td>
<td>3. Identify natural and man-made radiation sources in terms of energy and annual</td>
<td>• Final Examination</td>
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<td>exposure rates.</td>
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<td>4. Describe the electromagnetic spectrum in terms of energy, wavelength,</td>
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<td>frequency, and ionization.</td>
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<td>5. Explain the consequences of global or local radiation exposure from nuclear</td>
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<td>accidents/explosions.</td>
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<td>6. Describe radiation emergencies/accidents and the consequence of using radiation</td>
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<td>as a weapon.</td>
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<td>7. Differentiate between radiation quantities and units utilized past and present</td>
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<td>within the Radiologic Technology profession.</td>
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<td>8. Explain the historical evolution of radiation quantities and units.</td>
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<td>9. Explain the discovery of x-rays.</td>
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<td>10. Define somatic and genetic biologic effects.</td>
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<td>11. Differentiate between short-term and long-term somatic biologic effects.</td>
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<td>12. Explain exposure, absorbed dose and equivalent dose.</td>
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<td>13. Identify quality factors for different types of ionizing radiation.</td>
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<td>14. Identify radiation weighting factors for different types and energies of</td>
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<td>ionizing radiation.</td>
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<td>15. Identify organ or tissue weighting factors.</td>
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<td>16. Calculate effective dose, equivalent dose, and conversions of radiation</td>
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<td></td>
<td>quantity units.</td>
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<td>17. Define collective dose equivalent.</td>
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<tr>
<td>Course Objectives</td>
<td>Assessment Goals</td>
<td>Assessment Strategies</td>
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| **3. Explain the interactions of x-radiation with matter and attenuation of the beam according to energy, tissue composition, and pathological conditions.** (GEO 1, 2, 3, 7) | 1. Identify the exposure factors selected by the Radiologic Technologist which affect the occurrence of absorption, scatter, and transmission.  
2. Define absorption; explain its occurrence in the body, and its impact upon radiation exposure.  
3. Define scatter, explain its occurrence in the body, its impact upon image quality, and its effect upon occupational exposure.  
4. Explain attenuation according to the energy of the beam, part thickness, tissue composition, contrast administration, and pathology present.  
5. Differentiate between primary, secondary, and exit radiation.  
6. Explain photoelectric absorption, Compton scattering, coherent scattering, pair production, and photodisintegration. | • Assignments  
• Quizzes  
• Tests  
• Final Examination |
| **4. 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.** (GEO 1, 2, 3, 7) | 1. Identify and describe personnel monitoring devices used in the clinical setting.  
2. Explain the purpose of personnel monitoring devices.  
3. Describe the placement of personnel monitoring devices.  
4. Explain the advantages and disadvantages of the various types of personnel monitoring devices.  
5. Identify and describe radiation survey instruments used for area monitoring. | • Assignments  
• Quizzes  
• Tests  
• Final Examination |
| **5. Differentiate between the cell components and the various levels of biologic damage which may occur in living systems.** (GEO 1, 2, 3, 7) | 1. Define and explain the following radiation energy transfer determinants: linear energy transfer, relative biologic effectiveness, and oxygen enhancement ratio.  
2. Differentiate between high-LET and low LET radiation in terms of characteristics, biologic effects, and radiation energy.  
3. Describe the molecular effects of irradiation.  
4. Differentiate between direct and indirect action.  
5. Explain the radiolysis of water.  
6. Explain the effects of ionizing radiation on DNA.  
7. Describe the target theory and its effect upon the cell.  
8. Explain the cellular effects of irradiation.  
9. Identify radiosensitive cells in the body and explain why the cells have an adverse effect to radiation exposure.  
10. Explain the implications of whole body versus partial body radiation exposure and the significance timed exposed.  
11. Describe the processes of direct and indirect action as the result of ionizing radiation exposure.  
12. Describe the cell in terms of components, function, division, and composition. | • Assignments  
• Quizzes  
• Tests  
• Final Examination |
| **6. Differentiate between early and late radiation effects of ionizing radiation on organ systems.** (GEO 1, 2, 3, 7) | 1. Explain somatic and genetic damage factors.  
2. Differentiate between nonstochastic and stochastic effects from ionizing radiation.  
3. Explain the characteristics of acute radiation syndrome and the stages/exposure associated with each.  
4. Explain the graph which depicts the stages of acute radiation syndrome.  
5. Describe LD 50/30 and LD 50/60.  
6. Explain radiation exposure to specific organs/tissues and the biologic effects associated with each.  
7. Identify and explain radiation dose-response curves and the diseases/categories associated with each.  
8. Explain threshold and nonthreshold relationships.  
9. Differentiate between late nonstochastic and late stochastic effects.  
10. Differentiate between absolute and relative risk models. | • Assignments  
• Quizzes  
• Tests  
• Final Examination |
### Course Objectives

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<tr>
<td>11.</td>
<td>Describe radiation induced cancer in radium watch-dial painters, uranium miners, early medical radiation works, and atomic bomb survivors.</td>
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<td>12.</td>
<td>Explain the ETHOS project.</td>
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<td>13.</td>
<td>Describe life span shortening studies performed as a result of radiation exposure.</td>
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<td>14.</td>
<td>Explain cataractogenesis as a result of radiation exposure.</td>
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<td>15.</td>
<td>Describe the gestational stages and identify the most radiosensitive stage.</td>
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<td>16.</td>
<td>Identify the causes associated with genetic mutations.</td>
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<td>17.</td>
<td>Define the doubling dose concept and explain its application.</td>
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### Assessment Goals

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<tbody>
<tr>
<td>1.</td>
<td>Describe radiation safety features of radiographic equipment, devices, and accessories.</td>
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<tr>
<td>2.</td>
<td>Identify beam limiting devices and the purpose of each accessory.</td>
</tr>
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<td>3.</td>
<td>Define filtration and identify its purpose, amount, and function in radiographic equipment.</td>
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<td>4.</td>
<td>Identify and provide examples of compensating filters.</td>
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<td>5.</td>
<td>Define and explain the following terms/equipment: exposure reproducibility, exposure linearity, screen-film combinations, and radiographic grids.</td>
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<td>6.</td>
<td>Explain the minimal source to skin for mobile and fixed radiography systems.</td>
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<td>7.</td>
<td>Describe the radiation safety features of digital imaging equipment, devices, and accessories.</td>
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<td>8.</td>
<td>Describe radiation safety features of fluoroscopic equipment, devices, and accessories.</td>
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<td>9.</td>
<td>Describe radiation safety features of mobile c-arm fluoroscopy equipment, devices, and accessories.</td>
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<tr>
<td>10.</td>
<td>Describe radiation safety features of cine fluoroscopy, digital fluoroscopy, and high level control interventional procedures equipment.</td>
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<tr>
<td>11.</td>
<td>Identify immobilization devices and specific examples when they are applied.</td>
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<td>12.</td>
<td>Describe shielding devices and explain when each type are used.</td>
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<td>13.</td>
<td>Describe how technical exposure factors are used to reduce patient radiation exposure.</td>
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<td>15.</td>
<td>Explain the methods to prevent exposure to the pregnant patient.</td>
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<tr>
<td>16.</td>
<td>Explain radiation exposure to patients in various imaging modalities.</td>
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<tr>
<td>17.</td>
<td>Identify the types of primary and secondary barriers for radiation protection.</td>
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<tr>
<td>18.</td>
<td>Explain the protection of personnel during fluoroscopic examinations.</td>
</tr>
<tr>
<td>19.</td>
<td>Explain the protection of personnel during mobile radiographic examinations.</td>
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</tbody>
</table>

### Assessment Strategies

- Assignments
- Quizzes
- Tests
- Final Examination
**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.
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.
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.
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
collection/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.

Class Guidelines/Expectations
1. Be punctual and arrive to class before the scheduled meeting prepared to learn.
2. Attend all class sessions in their entirety.
3. Submit only completed work. Partially completed assignments will earn a grade of 0. No late
assignments will be accepted.
4. Read assigned chapters in the textbook(s) before class meetings.
5. Ask questions to the instructor and attend scheduled tutoring sessions for clarification on
course content areas.

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 11:00 pm on Sunday nights.
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.

Emergency Information
In the event of severe inclement weather or other emergency, information about the closing of the
college will be communicated via e2Campus and the College's website. Faculty will communicate
with students about their courses and course requirements, such as assignments, quiz and exam
dates, and class and grading policies, via Blackboard. Students will be responsible for completing
all assignments in accordance with class policies.

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.
**Services for Students with Disabilities**

Wor-Wic provides reasonable accommodations for students with disabilities, in compliance with the Americans with Disabilities Act of 1990 and Section 504 of the Rehabilitation Act of 1973. If you are in need of accommodations, please contact the counseling office at (410) 334-2899. For more information, see Wor-Wic's Services for [Students with Disabilities](#) web page.

**Attendance**

Students are expected to attend all class sessions. If a student misses a class session, it is the student’s responsibility to acquire the information reviewed and ask questions to the course instructor during tutoring. Students absent from class will not be permitted to make-up missed quizzes or graded assessments administered during the scheduled class session.

**Blackboard**

Blackboard is used as a supplementary site for all RDT courses. To access course content in Blackboard you need to have access to a computer with an Internet connection, (other requirements may apply). Computers that meet these requirements are available on campus in BH 217, HH 100, GH 204, FOH 305, and AHB 108.

Please follow these directions to access course syllabi and any other materials posted for this course:

*Login Information:*
1. From Wor-Wic home page, point to “Blackboard” at the bottom left of the page and click.
2. Enter your Wor-Wic user ID and password. Don’t know your user ID or password? Contact Student Services

**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 primary method of communication between students and the course instructor outside of the classroom.
  - 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) Study Guides and Reviews, and
(3) Assignment information. Content folders will be labeled by subject to organize course material.

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

Blackboard Integrity
All students logging into Blackboard affirm that they understand and agree to follow Wor-Wic Community College policies regarding academic integrity and the use of College resources as described in the college catalog. Wor-Wic Community College considers the following as violations of the computer usage policy:

1. Using the campus computing network and facilities to violate the privacy of other individuals.
2. Sharing of account passwords with friends, family members or any unauthorized individuals

Violators are subject to college disciplinary procedures.

ASSIGNMENTS/CLASSWORK (15% of weighted grade)

Classwork
(GEO 1, 2, 3, 4, 7, 8) (CO 1-7)

Students will complete classwork during scheduled course sessions. Participation is required to earn credit for classwork. Failure to attend class or arriving late/leaving early will result in students earning a grade of 0 for classwork participation. Classwork is part of the assignment weighted grade in the RDT 201 course evaluation.

Evolve Radiation Protection Quizzes/Exams
(GEO 2, 3, 7) (CO 1-7)

Students will read assigned chapters in the textbook BEFORE attending class sessions. In addition to reading the textbook, students will review the corresponding chapter in the Evolve online modules. Students will take quizzes before reporting to class demonstrating preparedness for discussing topics in class. Students will have two attempts to complete the quizzes and exam. Failure to complete Evolve quizzes/exams before reporting for class will result in students earning a grade of 0 for the assignment grade.
Mosby’s Comprehensive Review of Radiography Workbook
(GEO 2, 3, 4, 7) (CO 1-7)

Students will complete the Review of Radiation Protection section of the Mosby’s Comprehensive Registry Review Workbook.

1. Read and review chapter 2 pages 16 – 35. 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.

2. Go to [http://evolve.elsevier.com](http://evolve.elsevier.com). Follow the directions on the front cover of the textbook. Complete the study session for Radiation protection. Complete the 242 practice questions. Students will take a “screen shot” of the score earned and submit to the course instructor for credit. The score earned is the score recorded in the grade book.

Full credit is received for the completion of the workbook questions. Score earned is the score recorded for the online radiation protection questions. Students will have to provide the course instructor a screen shot of the completed questions.

**NO LATE ASSIGNMENTS OR INCOMPLETE ASSIGNMENTS WILL BE ACCEPTED.** Failure to complete all activities for Radiation Protection in the Mosby’s book and follow the directions outlined above will receive a grade of 0.

RADREVIEW Easy Registry Review
(GEO 2, 3, 4, 7) (CO 1-7)

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 use the ARRT Simulation mode for the assignment.**

Students are required to email the instructor through Blackboard the scores earned, and the username/password to review scores for credit.

RADTUTOR Registry Review Tests
(GEO 2, 3, 4, 7) (CO 1-7)

Students will complete registry review tests in the [www.radtutor.com](http://www.radtutor.com) 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 use the ARRT Simulation mode for the assignment.**

Students are required to email the instructor through Blackboard the scores earned, and the username/password to review scores for credit.
**St. Catherine Registry Review Tests**  
(GEO 2, 3, 4, 7) (CO 1-7)

The St. Catherine registry review tests provide students with a comprehensive review of the Radiologic Technology curriculum. Students will arrange a time with the course instructor to complete the registry review tests. No textbooks, notes, or references are permitted. Students will complete two St. Catherine tests for the RDT 201 course.

Students will have to arrange a time with the course instructor to complete the St. Catherine exams outside of the scheduled class session.

**Credit for St. Catherine review tests will be based upon the following grading criteria:**

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<th>POINTS</th>
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<td>40 to 49 points</td>
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<td>50 to 59 points</td>
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<td>60 to 65 points</td>
<td>70%</td>
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<td>66 to 70 points</td>
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<td>71 to 75 points</td>
<td>80%</td>
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<td>76 to 80 points</td>
<td>85%</td>
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<td>81 to 85 points</td>
<td>90%</td>
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<td>86 points and higher</td>
<td>100%</td>
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**Failure to complete the St. Catherine Registry Review Tests will result in a 0 for the assignment. TESTS COMPLETED LATE WILL NOT BE ACCEPTED. Failure to follow directions will result in a grade of 0 for the assignment.**

**Electronic/Information Literacy Writing Assignment (15% of the weighted grade)**  
(GEO 1, 3, 7) (CO 2, 6)

Students will complete a paper on the following topic: **Radiation Accidents**. For this writing assignment students will research this topic in the WWCC database and on radiologic technology educational websites. The following are the requirements for the RDT 201: Radiation Protection and Radiobiology writing assignment.

1. The paper should follow APA format including headings, page numbers, a running head, title page, reference page, and the body of the paper should contain a minimum of five APA in-text citations. Use the paper template posted in Blackboard to ensure all APA paper format requirements are accurately followed.
2. The paper should be completed using Times New Roman, 12-point font, double-spaced, and the length requirement is a minimum of 500 words with a maximum of 750 words of content information included in the body of the paper.
3. A minimum of two electronic resources referenced in APA format is a requirement for this writing assignment. Five APA in-text citations should be included within the body of the paper.
4. Describe the radiation accident including the site of the accident, date of occurrence, summary of events, and the aftermath of radiation exposure.
5. Explain three lessons learned from researching your selected topic.
6. Students are required to attend an APA writing conference to learn about APA formatting and APA citations. Attending a writing conference accounts for part of the writing assignment grade.

Students should reference the RDT 201 Electronic Information Literacy Writing Assignment grading rubric included within the course syllabus for additional details regarding evaluation criteria for this assignment.

The following is a list of Radiologic Technology electronic resources that may be used for the RDT 201 Writing Assignment:

8. https://www.arrt.org/

The Electronic/Information Literacy writing assignment is Due October 2, 2016 by 11:00 pm EST. Students should submit the assignment through Blackboard email. NO LATE PAPERS WILL BE ACCEPTED. FAILURE TO SUBMIT THE PAPER BY October 2, 2016 11:00 pm EST WILL EARN A 0.

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.

Besides the mandatory required attendance at an APA writing conference, if you wish to have additional help on a writing assignment, you may schedule an appointment with a writing conference instructor by going to your MyWorWic portal, selecting the Student Resources tab and then selecting Academic Support. Click on Writing Conferences to schedule a conference. Limited time slots are available, so an appointment is required. If you cannot keep your appointment, it is your responsibility to cancel it by going back to the Writing Conferences link. Please note that writing conferences are conducted in BH 227.

Quizzes (15% of the weighted grade)
(GEO 1, 2, 3, 4, 7) (CO 1-7)

Students will complete quizzes on information presented in reading assignments, class lecture, and through PowerPoints. Quizzes administered during class sessions will have a time limit for completion. Quizzes will be distributed throughout the semester to measure the student’s comprehensive knowledge of course concepts and to encourage class attendance. Students are expected to complete chapter reading assignments before scheduled class meetings for quiz preparation. Quizzes will not be announced and will be given at different times throughout the class session. Students who report late or leave early may miss the quiz. NO MAKE-UP QUIZZES WILL BE ADMINISTERED. STUDENTS SHOULD ANTICIPATE A QUIZ FOR ALL CLASS MEETINGS.
Tests (35% of the weighted grade)
(GEO 1, 2, 3, 4, 7) (CO 1-7)

Chapter tests will be administered throughout the semester. Three tests will be administered in RDT 201. **NO MAKE-UP TESTS WILL BE ADMINISTERED.**

Comprehensive Final Examination (35% of the weighted grade)
(GEO 1, 2, 3, 4, 7) (CO 1-7)

The comprehensive final examination will cover all radiation protection/radiobiology topics reviewed throughout the semester. **NO MAKE-UP FINAL WILL BE ADMINISTERED.**

Course Evaluation
Assignments/Classwork ................................................................. 15%
   - Radreview
   - Radtutor
   - Mosby Workbook
   - St. Catherine Tests
   - Classwork
   - Paper
   - Evolve Quizzes/Exams

Quizzes ................................................................................................... 15%

Exams ..................................................................................................... 35%
Comprehensive Final .................................................. 35%

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.

Students are required to use a computer and the internet for this course. Any student who does not have this access at home will need to make arrangements to complete all coursework on campus. All students are required to complete all coursework according to the due dates documented in the course syllabus.

**An assignment schedule will be posted in Blackboard by the first day of class**
RDT 201: Radiation Protection and Biology
TENTATIVE LECTURE SCHEDULE
Mondays 9:00 am – 11:00 am

September
12  Chapter 1: Introduction to Radiation Protection
    Chapter 2: Radiation Types, Sources, Doses Received
19  Chapter 2: Radiation Types, Sources, Doses Received
    Chapter 3: Interactions of X-Radiation with Matter
*27 Chapter 3: Interactions of X-Radiation with Matter
    Chapter 4: Radiation Quantities and Units

October
  3 Chapter 4: Radiation Quantities and Units
     Chapter 5: Radiation Monitoring
10  Chapter 5: Radiation Monitoring
17  TEST ONE
24  Chapter 6: Overview of Cell Biology
     Chapter 7: Molecular/Cellular Radiation Biology
31  Chapter 7: Molecular/Cellular Radiation Biology
     Chapter 8: Early Radiation Effects

November
  7 Chapter 8: Early Radiation Effects
     Chapter 9: Late Radiation Effects
14  Chapter 9: Late Radiation Effects
     Chapter 10: Dose Limits for Exposure
21  TEST TWO
28  Chapter 11: Equipment Design
     Chapter 12: Management of Patient Dose
     Chapter 13: Management of Imaging Personnel

December
  5 TEST THREE
13  COMPREHENSIVE FINAL EXAMINATION
<table>
<thead>
<tr>
<th>Criteria</th>
<th>Non-performance</th>
<th>Needs Improvement</th>
<th>Approaches Expectations</th>
<th>Meets Expectations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Spelling</strong></td>
<td>More than four spelling errors are present throughout the paper.</td>
<td>Three to four spelling errors are present in the discussion post.</td>
<td>One to two spelling errors are present in discussion post.</td>
<td>Paper is free of spelling errors.</td>
</tr>
<tr>
<td><strong>Grammar</strong></td>
<td>Does not demonstrate knowledge of grammatical rules as expressed in the English Language.</td>
<td>Three to four grammatical errors are identified in the paper.</td>
<td>One to two grammatical errors are identified in the paper.</td>
<td>Paper is free of grammatical errors.</td>
</tr>
<tr>
<td><strong>Length Requirement</strong></td>
<td>Paper has less than 425 words.</td>
<td>Paper has 425 to 449 words in the content section.</td>
<td>Paper has 450 to 499 words in the content section.</td>
<td>Paper has a minimum of 500 words and a maximum of 750 words. The word count DOES NOT include the title or works cited page. This is CONTENT only.</td>
</tr>
<tr>
<td><strong>Sentence Fluency</strong></td>
<td>Frequent run-on or fragment sentences are present throughout the paper. No variety in sentence structure.</td>
<td>Many run-on or fragment sentences identified within the paper with limited sentence structure variation.</td>
<td>Sentence structure is varied throughout the paper.</td>
<td>Sentence structure is varied throughout the paper and ideas are clearly connected.</td>
</tr>
<tr>
<td><strong>Content</strong></td>
<td>Less than two content areas are included in the writing assignment.</td>
<td>Two of the four content areas are included in the writing assignment.</td>
<td>Three of the four content areas are included in the writing assignment.</td>
<td>Describe the radiation accident including the site of the accident, date of occurrence, summary of events, and the aftermath of radiation exposure.</td>
</tr>
<tr>
<td><strong>Explains Lessons Learned</strong></td>
<td>Does not explain lessons through the conduct of research.</td>
<td>Explains one lesson learned through researching the selected topic.</td>
<td>Explains two lessons learned through researching the selected topic.</td>
<td>Explains a minimum of three lessons learned through researching the selected topic.</td>
</tr>
<tr>
<td><strong>References in APA Format</strong></td>
<td>Does not provide references in APA format and/or the required minimum number of resources.</td>
<td>One electronic resource are provided in APA format.</td>
<td>A minimum of two educational electronic resources are provided in APA format.</td>
<td></td>
</tr>
<tr>
<td><strong>APA Citations</strong></td>
<td>In-text citations are not included and/or are not accurately documented in APA format.</td>
<td>Paper includes three accurately documented APA citation within the text of the paper.</td>
<td>Paper includes four accurately documented APA citations within the text of the paper.</td>
<td>Paper demonstrates APA format with 12 point Times New Roman font, a running head on the title page, page numbers, headings, double-spaced, etc. as required.</td>
</tr>
<tr>
<td><strong>APA Paper Format</strong></td>
<td>More than two errors in APA format are identified within the paper.</td>
<td>Two errors in APA format are exhibited</td>
<td>One error in APA format is exhibited in the paper.</td>
<td>Paper includes a title page, introduction/conclusion, a minimum of 500 words of content, and a reference page.</td>
</tr>
<tr>
<td><strong>Paper Components</strong></td>
<td>More than three paper elements are not included.</td>
<td>Three paper elements are not included.</td>
<td>Two paper elements are not included.</td>
<td>Paper includes a title page, introduction/conclusion, a minimum of 500 words of content, and a reference page.</td>
</tr>
<tr>
<td><strong>Writing Conference Attendance</strong></td>
<td>The student does not attend the entire writing conference.</td>
<td></td>
<td></td>
<td>Student attends an APA writing conference in its entirety and provides evidence of attendance from the writing conference instructor.</td>
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</tbody>
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