RDT 256 D01
Spring 2017
Instructor: Karie Solembrino, M.S., R.T. (R)(CT)(ARRT)
Department Head and Professor of Radiologic Technology

Class Times:
   Lecture: Mondays, 12:00 p.m. – 2:00 p.m.
   Office Hours:
     Mondays 2:15 pm – 5:15 pm
     Wednesdays 2:45 pm – 4:15 pm
     Thursdays 8:45 am – 9:15 am
     Additional hours by appointment

Office: AHB 307H
Phone: 410-572-8741
Email: ksolembrino@worwic.edu
Access to course instructor via Blackboard

Associate: 410-572-8740

Text


Online Module
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 includes the study of imaging equipment and its safe operation in clinical application. Generators, x-ray circuitry, tube components, and QA monitoring maintenance are covered. Computed Tomography, MRI, Mammography and Diagnostic Imaging equipment are discussed. Two lecture hours per week. Prerequisites: RDT 104 and 154 with a grade 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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</table>
| 1. Identify the components of the x-ray circuit and describe the function of each part. (GEO 1, 2, 3, 4, 7) | 1. Describe the general components and function of the primary, secondary, and filament circuits.  
2. Explain the function of solid state rectification.  
3. Differentiate between a series and a parallel circuit.  
4. Describe the function and purpose of the autotransformer, step-up transformer, and step down transformer within the x-ray circuit.  
5. Explain the Ohm’s law and complete calculations using this principle.  
6. Explain the transformer and autotransformer laws and complete calculations by applying these principles.  
7. Identify the components of an x-ray circuit on a schematic diagram. | • Examinations  
• Quizzes  
• Assignments |
| 2. Differentiate between the types of generators and describe their utilization within medical imaging equipment. (GEO 1, 2, 3, 4, 7) | 1. Compare single phase, three phase, high frequency, and falling load generators in terms of radiation protection and efficiency.  
2. Describe each type of generator according to voltage ripple, generator factor, and heat units produced for radiographic exposures. | • Examinations  
• Quizzes  
• Assignments |
| 3. Describe the quality control tests which ensure consistent x-ray production and the implementation of a QA system within the Radiology department. (GEO 1, 2, 3, 7) | 1. Differentiate between quality improvement/management, quality assurance, and quality control.  
2. Explain the benefits of a quality management program to the patient and the medical imaging department.  
3. Describe the proper test equipment/procedures for evaluating the operation of the x-ray generator.  
4. Describe the proper test equipment/procedures for evaluating image quality. | • Examinations  
• Quizzes  
• Assignments |
| 4. Explain Computed Tomography equipment operation, application, procedures, image analysis, artifact recognition, and patient dose considerations according to selected imaging procedure parameters. (GEO 1, 2, 3, 5, 7) | 1. Describe the generators of C.T. equipment.  
2. Explain data acquisition methods to include slice by slice and volumetric acquisition.  
3. Describe beam geometry.  
4. Explain components of the digital acquisition system.  
5. Describe the data acquisition process of scanning, acquiring raw data and evaluating image data.  
6. Explain beam attenuation as it applies to CT.  
7. Explain the selectalbe scan factors manipulated for each exam.  
8. Explain the use of power injectors and their application in CT.  
9. Identify CT image artifacts.  
10. Explain post processing parameters.  
11. Describe radiation protection for the patient and radiographer in CT.  
12. Describe the components of the CT imaging system.  
13. Differentiate between conventional and spiral/helical CT scanning.  
14. Explain the functions of collimators.  
15. Define CT terminology.  
16. Describe CT image storage techniques.  
17. Describe the controls on the CT console and the function of each. | • Examinations  
• Quizzes  
• Assignments |
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<tr>
<th>Course Objectives</th>
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<th>Assessment Strategies</th>
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</thead>
<tbody>
<tr>
<td>5. Describe the equipment operation of the MRI system, safety considerations,</td>
<td>1. Describe the basic principles of MRI image acquisition.</td>
<td>• Examinations</td>
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<tr>
<td>procedures, and the patient screening process for MRI exams.</td>
<td>2. Differentiate between open and closed MRI units in terms of magnetic strength, type of magnet,</td>
<td>• Quizzes</td>
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<td></td>
<td>and exam considerations.</td>
<td>• Assignments</td>
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<tr>
<td>(GEO 1, 2, 3, 5, 7)</td>
<td>3. Explain the patient screening process completed before an MRI procedure.</td>
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<td>4. Identify the safety risks and contraindications associated with MRI.</td>
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<td>6. Describe the principles of electricity, magnetism, and electromagnetism as</td>
<td>1. Define potential difference, current, and resistance.</td>
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<tr>
<td>each applies to diagnostic imaging equipment operation.</td>
<td>2. Describe the characteristics of direct and alternating currents.</td>
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<tr>
<td>(GEO 1, 3, 7)</td>
<td>3. Identify different types of magnets and the purpose each serves.</td>
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<td></td>
<td>4. Explain the principles of electrostatics and magnetism.</td>
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<td>7. Explain mammography equipment operation, image acquisition, and image</td>
<td>1. Describe the basic principles of mammography image acquisition.</td>
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<td>evaluation as it applies to the diagnostic screening procedure.</td>
<td>2. Identify the components of the mammography x-ray tube.</td>
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<td>(GEO 1, 2, 3, 5, 7)</td>
<td>3. Differentiate between mammography and diagnostic imaging in terms of focal spot sizes, use of</td>
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<td></td>
<td>magnification, exposure parameters, and target material.</td>
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<td>4. Explain the purpose of breast compression.</td>
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<td>5. Identify and describe the routine mammography projections completed in terms of anatomical</td>
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<td>structures and evaluation criteria.</td>
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<td></td>
<td>6. Explain the mammography patient screening process.</td>
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<td>8. Describe the principles of imaging analysis to include artifact recognition,</td>
<td>1. Define image artifacts.</td>
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<td>exposure miscalculations, positioning errors, and poor image quality associated</td>
<td>2. Identify plus-density artifacts on a radiographic film.</td>
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<td>with a degradation of recorded detail.</td>
<td>3. Identify minus-density artifacts on a radiographic film.</td>
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<tr>
<td>(GEO 1, 2, 3, 7)</td>
<td>4. Describe artifacts on a digital image.</td>
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<td></td>
<td>5. Evaluate images in terms of positioning, exposure, and recorded detail.</td>
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<td>6. Identify reasons for repeat radiographs and explain Corrective actions for each type of error.</td>
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<td></td>
<td>• Examinations</td>
<td>• Quizzes</td>
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<td>• Assignments</td>
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<td>• Assignments</td>
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</table>
Course Content

1. Components of the x-ray tube.
2. Components of the x-ray circuit.
5. CT image acquisition.
6. CT image reconstruction.
7. CT Radiation protection considerations.
8. CT patient screening process.
9. CT equipment.
10. CT beam attenuation principles.
11. MRI image acquisition.
12. MRI contraindications and safety considerations.
13. MRI equipment.
14. MRI patient screening process.
15. Quality assurance and quality control principles.
16. Quality control testing.
17. Recognition of artifacts in radiographic film, the digital image, and CT images.
18. Image analysis in terms of radiographic positioning, exposure, and recorded detail.
19. Mammography image acquisition.
20. Mammography equipment.
22. Mammography image evaluation.
23. X-ray generators.
24. X-ray production according to type of generator.

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.
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.

Emergency Information Statement
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.

Sexual Violence Disclosures
Wor-Wic Community College seeks a campus free of sexual violence which includes sexual harassment, domestic violence, dating violence, stalking, and/or any form of sex or gender discrimination. Please be aware that if a student discloses a personal experience verbally or in writing as a Wor-Wic student to a faculty or staff member, the employee cannot maintain confidentiality and has the mandatory responsibility to notify one of the college’s Title IX coordinators. However, if you’d like to make a confidential disclosure of any such violence, you can contact Wor-Wic’s director of counseling (X-2900) or you can contact the Life Crisis Center at 410-749-HELP or 2-1-1

Information on rights of victims of sexual violence and related resources is available in the college catalog and at the public safety page of Wor-Wic’s website: http://www.worwic.edu/Administration/PublicSafety.aspx.

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.
Class Communication
Blackboard is used in all RDT courses as a source of communication between instructors and students. Weekly announcements and emails will be posted in Blackboard. Students are required to use Blackboard to submit assignments and for class communication. It is the student’s responsibility to enter Blackboard daily in all RDT courses to view messages, announcements, retrieve class notes, and review materials.

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/CASSWWORK (15% of course weighted grade)

Classwork
(GEO 1, 3, 4, 6) (CO 1-8)

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 256 course evaluation.

Mosby’s Comprehensive Review of Radiography Workbook
(GEO 1, 3, 4, 5, 6) (CO 1-8)

Students will complete the Review of Equipment Operation and Quality Control section of the Mosby’s Comprehensive Registry Review Workbook.

1. Read and review chapter 3 pages 36 – 52. 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. Follow the directions on the front cover of the textbook. Complete the study session for Equipment Operation and Quality Control. Complete the 213 practice questions. Submit your score to the course instructor for credit. (You will need to keep a tally of correct vs. incorrect answers while working in the study mode).

NO LATE ASSIGNMENTS OR INCOMPLETE ASSIGNMENTS WILL BE ACCEPTED. Failure to complete all activities for Equipment Operation and Quality Control section in the Mosby’s book will receive a grade of 0.
**RADREVIEW Easy Registry Review**  
(GEO 1, 3, 4, 5, 6) (CO 1-8)  
Students will complete Equipment Operation registry review tests in the [www.radvieweasy](http://www.radvieweasy) website. The score received is the score earned. **Students must score a minimum of 85% on each equipment operation registry review test.** Students are not permitted to submit scores less than an 85%. **Scores submitted less than a 85% will receive a grade of 0 for the assignment. Students must use the ARRT Simulation mode for the assignment.**  
Students are required to submit Radreview assignments through the provided Blackboard assignment links.

**RADTUTOR Registry Review Tests**  
(GEO 1, 3, 4, 5, 6) (CO 1-8)  
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 85% on each equipment operation registry review test.** Students are not permitted to submit scores less than an 85%. **Scores submitted less than a 85% will receive a grade of 0 for the assignment. Students must use the ARRT Simulation mode for the assignment.**  
Students are required to submit Radtutor assignments through the provided Blackboard assignment links.

**St. Catherine Registry Review Tests**  
(GEO 1, 3, 4, 5, 6) (CO 1-8)  
The St. Catherine registry review tests provide students with a comprehensive review of the Radiologic Technology curriculum. These registry review tests will be administered during class. No textbooks, notes, or references are permitted. Students will complete **two** St. Catherine tests for the RDT 256 course. The score earned is the score recorded.  
**Failure to complete the St. Catherine Registry Review Tests will result in a 0 for the assignment.**

**Electronic/Information Literacy Writing Assignment**  
(GEO 1, 3, 5) (CO 3, 4, 5, 7)  
For the electronic/information literacy writing assignment, students will research quality control of radiologic technology equipment. Students will research the Wor-Wic Community College Electronic databases and radiologic technology websites to investigate quality control practices for radiologic technology equipment. The following are writing assignment components:

1. Students will select a specific modality to research **quality control equipment practices.** Students may choose from the following imaging modalities for this assignment: CT, MRI, Mammography, or Diagnostic Imaging.
2. Summarize the quality control equipment practices including a minimum of four specific tests or parts of the equipment that are tested to ensure image quality.
3. Describe the importance of quality control to image quality and patient dose.
4. Describe three specific lessons learned from researching this topic.
5. A fully developed introduction and conclusion. The introduction should explain the purpose of the paper and introduce the subtopics of the paper including 5 complete sentences. The conclusion should summarize the information presented in the paper including 5 complete sentences.
6. The paper should be 3 full pages, double-spaced, 12-point Times New Roman font, and a minimum of 500 words of content.
7. Headings should be included introducing each new topic to the reader.
8. APA format must be followed throughout the paper including a reference page and in-text citations adhering to APA guidelines.
9. Three electronic resources are required for this assignment.

The following is a list of Radiologic Technology electronic resources which may be used for the RDT 256 Paper:

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

The Electronic/Information Literacy assignment is a college requirement. Students who fail to submit the paper or do not submit the paper by the due date will receive a 0 for the assignment.

Students should reference the RDT 256 Electronic Information Literacy Writing Assignment grading rubric posted on Blackboard for additional details regarding evaluation criteria for this assignment.

The Electronic/Information Literacy writing assignment is Due April 2, 2017 by 11:00 pm EST in Blackboard through the assignment link. No late writing assignments will be accepted. Failure to submit the writing assignment by April 2, 2017 11:00 pm EST will earn a grade of 0.

Reading and Writing Center (MTC204): You may seek writing assistance from a qualified instructor in the Reading/Writing Center. These “drop in” conferences are available on a “first-come, first-served” basis during the regular hours of the Reading and writing Center, so do not wait until the last minute to seek writing assistance. Come prepared with your original assignment and a printed copy of your written work. Center hours are: M&Th. 8:30-6:30; T&W: 8:30-8:00; F: 10:00-1:30; Sat 10:00-1:00. Do not wait until the day before an assignment is due to seek assistance.
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. The assignment should be submitted through the assignment link provided in Blackboard.

**Quizzes (15% of weighted course grade)**  
(GEO 1, 3, 4, 5, 6) (CO 1-12)

Students will complete quizzes and classwork on information presented in reading assignments, class lecture, and through PowerPoints. Quizzes/Classwork administered during class sessions will have a time limit for completion. Quizzes/Classwork 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/CLASSWORK WILL BE ADMINISTERED. STUDENTS SHOULD ANTICIPATE A QUIZ FOR ALL CLASS MEETINGS.**

**Tests (35% of weighted course grade)**  
(GEO 1, 3, 4, 6) (CO 1-8)

Chapter tests will be administered throughout the semester. Three tests will be administered in RDT 256. Study guides will be provided for all chapter tests. **NO MAKE-UP TESTS WILL BE ADMINISTERED. A GRADE OF 0 WILL BE EARNED IF A TEST IS MISSED DUE TO ABSENCE.**

**Comprehensive Final Examination (35% of weighted course grade)**  
(GEO 1, 3, 4, 6) (CO 1-8)

The comprehensive final examination will cover all topics reviewed throughout the semester in RDT 256. A study guide will be provided for the final exam. **NO MAKE-UP FINAL WILL BE ADMINISTERED.**

<table>
<thead>
<tr>
<th>Course Evaluation</th>
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<tr>
<td>Assignments/Classwork</td>
<td>A 93 – 100</td>
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<tr>
<td>Quizzes</td>
<td>B 84 – 92</td>
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<tr>
<td>Tests</td>
<td>C 75 – 83</td>
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<tr>
<td>Comprehensive Final Exam</td>
<td>D 66 – 74</td>
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<td>F 0 – 65</td>
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</table>
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**
## TENTATIVE LECTURE SCHEDULE

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<thead>
<tr>
<th>Month</th>
<th>Date</th>
<th>Topics</th>
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<td>Chapter 2: Structure of the Atom</td>
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<td>Chapter 3: Electromagnetic and Particulate Radiation</td>
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<td></td>
<td>30</td>
<td>Chapter 4: The X-Ray Circuit</td>
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<tr>
<td>February</td>
<td>6</td>
<td>Chapter 4: The X-Ray Circuit</td>
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<td></td>
<td>13</td>
<td>Chapter 4: The X-Ray Circuit</td>
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<td></td>
<td>20</td>
<td>Chapter 5: The X-Ray Tube</td>
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<td>Chapter 6: X-Ray Production</td>
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<td>27</td>
<td><strong>TEST ONE</strong></td>
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<tr>
<td>March</td>
<td>6</td>
<td><strong>SPRING BREAK</strong></td>
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<td></td>
<td>13</td>
<td>Chapter 16: Computed Tomography</td>
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<td></td>
<td>20</td>
<td>Chapter 16: Computed Tomography</td>
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<td></td>
<td>27</td>
<td>Mammography/MRI (Bontrager Book)</td>
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<td>April</td>
<td>3</td>
<td><strong>TEST TWO</strong></td>
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<tr>
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<td>10</td>
<td>QA/Image Artifacts/Image Analysis</td>
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<td></td>
<td>17</td>
<td>QA/Image Artifacts/Image Analysis</td>
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<td></td>
<td>24</td>
<td><strong>TEST THREE</strong></td>
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<td></td>
<td>26</td>
<td><strong>COMPREHENSIVE FINAL EXAM</strong></td>
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