RAD 276: Principles of Imaging Equipment  
Spring 2014 semester  
3 credits (45 lecture Hours)  

Instructor:  
Professor Joseph A. Mamatz, Jr.  
Academic Program Director  
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Perquisites:  
RAD 180, 181 and 182  

Corequisites:  
RAD 281, 282  

COURSE DESCRIPTION  

The overall focus of this course is orient the student radiographer to the fundamental principles, operation and application radiation-producing imaging equipment used in diagnostic imaging. Topics of this course include atomic structure, radiation, diagnostic x-ray circuit, tomography, image intensification, mobile and automatic exposure control units. Radiation safety and patient care principles are reinforced.

Student Learning Objectives

Upon completion of the lecture, readings, and assignments, the student must be able to:  
- Apply principles of atomic theory to the practice of creating radiographic images.  
- Explain the components and characteristics of the electromagnetic spectrum. 
- Differentiate ionizing from nonionizing radiation.  
- Interpret sine wave illustrations- speed, energy, frequency and wavelength.  
- Apply principles of electricity and magnetism to the x-ray circuit and the production of radiation.  
- Explain the function of each integral part of the x-ray circuit.
- Identify the parts of the x-ray circuit, x-ray tube, and image intensifier tube on illustrations.  
- Identify the metals and materials that are used in the circuit, image intensifier tube and the x-ray tube.  
- Explain the physical operations of the circuit, x-ray tube, AEC, mobile unit and tomography.  
- Correlate the physical operation of the imaging units to the production of x-ray and image formation.  
- Explain the operation and application of automatic exposure control.  
- Identify and explain the effects of improper cell selection on the formation of the image.
REQUIRED TEXTBOOKs

Author: Fosbinder and Orth  
Title: Essentials of Radiologic Science  
Publisher: Delmar  

Author: Wallace, Jeri Ellen  
Title: Radiographic Exposure: Principles and Practice  
ISBN: 10-0-8036-0051-8  
Publisher: FA Davis

STUDENT LEARNING OUTCOMES

Means of Assessing/ Measuring Success:

Students will score no less than a 75% on quizzes, assignments, discussion and any course projects to measure acceptable content proficiency. A 75% average of the midterm and finals combined is needed to pass the course.

TEACHING METHODOLOGIES AND LEARNING STRATEGIES

- Structured Lecture Presentations
- Instructor- Guided Discussion
- Cooperative learning (groups)
- Handouts
- Related Learning Materials
- Learning modules
- Diagrams and Illustrations
- Web based work
COURSE GRADE REQUIREMENTS

30% Quizzes
Content for tests is based on lecture, readings, worksheets and assignments. Question items will be of multiple choice, short answers, matching and fill-in-the blanks and is comprehensive. One makeup will be given for those students missing one test as it will be given at the end of the semester. Be advised that the quizzes each week will be comprehensive to include all lectures, power points and readings.

10% Worksheets/ online and Discussion
Each week a discussion question is posted on Moodle. You are to make one initial post and response to 2 of your classmate’s postings. After each module, you will be given worksheets that will reinforce theory.

10% class recorder
The student will write 25 multiple choice questions on the previous unit on PPT slides. The instructor will assign the student each. A rubric will be used to grade the presentation and quality of the questions. You MUST be able to explain the question, reference the question, and explain the concept.

25% Midterm Examination
An extensive examination that includes ALL content covered in lecture, reading and assignments.

30% Final Examination
An extensive examination that includes all content covered throughout the course and all reading, discussions.

Letter Grade Correlation
- A 92-100%
- B+ 89-91%
- B 83-88%
- C+ 80-82%
- C 75-79%
- D Not recognized by the program
- F 74% and lower

The development of professional behaviors is of moist important to your success in the program and in the field. Therefore, the student is apprised of the following point deductions:

✓ minus two points per each late event/ early leaving event; unauthorized.
✓ minus three points for each day absent.
✓ minus 10 points for a late arrival for a quiz, test or examination.
## COURSE SUBJECT MATTER

<table>
<thead>
<tr>
<th>Week</th>
<th>Content</th>
<th>Assignments</th>
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<tbody>
<tr>
<td>01</td>
<td>Atomic structure</td>
<td>Chapter 1</td>
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<td>Prepare for quiz</td>
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<td>02/03</td>
<td>Radiation &amp; electrostatics</td>
<td>Chapter 2</td>
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<td>Prepare for quiz</td>
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<td>04</td>
<td>Electricity</td>
<td>Chapter 3</td>
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<td>Prepare for quiz</td>
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<tr>
<td>05/06/07</td>
<td>X-ray Circuitry</td>
<td>Chapter 4</td>
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<td>Prepare for MIDTERM</td>
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<td>08</td>
<td>Midterm Exam</td>
<td>Chapter 5</td>
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<td>X-ray tube, heat units &amp; charts</td>
<td>Prepare for quiz</td>
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<td>09/10</td>
<td>Radiation Production</td>
<td>Chapter 6</td>
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<td>Spectra Charts; interpretation</td>
<td>Prepare for quiz</td>
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<td>Mobile Units</td>
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<td>11</td>
<td>Automatic exposure control</td>
<td>Wallace, Chapter 18</td>
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<td>Prepare for quiz</td>
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<td>12/13</td>
<td>Quality Control</td>
<td>Chapter 15</td>
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<td>Prepare for quiz</td>
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<td>14</td>
<td>Imaging equipment &amp;</td>
<td>Wallace, Chapter 1</td>
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<td></td>
<td>Technique correlation</td>
<td>Prepare for FINAL</td>
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<td>Course Final Examination</td>
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POLICIES

Student Preparation Policy (CP 1)
In order to maximize the laboratory experience, students must review and study the lecture content before each laboratory session. Please bring the textbook, notebook, and supplemental materials to each laboratory session. It is the students responsibility to check, read and respond to emails.

Notice of Changes Policy (CP 2)
The student is apprised that this document is subject to change. When any change is made the instructor will notify you in class or electronically.

Midterm and Final Examination Policy (CP 3)
In order to pass 276, the student must acquire an average of a 75% or higher on the midterm and final examinations together. In the event the student fails to do so, the grade assigned for the course would be an F grade, regardless of the grades acquired on any test, practicum, or participation grades in this course.

Make – Policy (CP 4)
One makeup quizzes, examinations, or tests will be given. However, under extenuating circumstances a makeup is permissible when supported by appropriate documentation. The instructor does not need personal information. Only one make up assessment will be given. There is a minus 10 point deduction for lateness to any test, quiz or examination

Attendance Policy (CP 5)
Students meet a minimum number of didactic hours in the curriculum; therefore students are expected to attend all class sessions.

Bergen Community College’s attendance policy states: “All students are expected to attend punctually every scheduled meeting of each course in which they are registered. Attendance and lateness policies and sanctions are to be determined by the instructor of each course. These will be established in writing on the individual

Your attendance and participation in the classroom and laboratory aspects of the courses is mandatory. Time late or absent is tracked. Your grade will be lowered.

The rationale for our attendance and progression policies is to help you achieve success with the course and clinical performance. Absences and consistent tardiness affects course and clinical performance.

You are expected to be aware of course start times. You must allow sufficient time for travel and traffic. Late arrivals are distracting to the instructor and other students. There outside of the door will be locked. The inside will remain where the students can walk in and out at any time.
STUDENT SYLLABUS and COURSE OF STUDY for LECTURE

Academic Conduct (CP 6)
The faculties adhere to the policy statement governing academic conduct as outlined in the Bergen Community College catalog. Faculty may not post exam grades due to privacy laws. Faculty reserve the right to delay the return of exam grades until all students have taken the exam and faculty review of the exam has been completed. Cheating, plagiarism, and unethical behavior will not be tolerated. Any student who has demonstrated any of the above behaviors will be disciplined according to college procedures.

Electronic Devices Policy (CP 7)
- The use of electronic devices in class is permissible.
- Phones, IPHONES, I Pads, and tablets are to be used to take notes only.
- For academic success, you must take notes. Power points will be uploaded to Moodle for duplication and study.
- Therefore, attendance, punctuality, and attentiveness are critical for success. Phones are not permitted during ANY testing.
- This action will be considered “academic dishonesty”.
- Therefore, students who are found using the phone in any way during any course assessment will be brought to the attention of the Deans of Health Professions and Judicial Affairs, for appropriate action.
- Mobile devices are to be turned off while in class or lab
- Students will be dismissed from class when this policy is NOT followed.