

## FALL 2023 – XRA 111 RADIOLOGIC SCIENCE 1

### Faculty Information:

**Instructor:** Prof. Jarek Stelmark  
**Office:** A307-K  
**Office Hours:** Tuesday 12:30 – 1:45 pm  
Friday 08:00 – 9:15 am  
**Phone:** (718) 518-4119 (*direct*) or 4123 (*secretary*)  
**E-mail:** [jstelmark@hostos.cuny.edu](mailto:jstelmark@hostos.cuny.edu)

### Course Description:

This course introduces students to the fundamentals of analog and digital radiography, which includes the performance of hands-on lab exercises. In the lecture part of the course, students will discriminate between analog and digital receptor components and identify steps in the imaging processing of both systems. In the lab component for the course, the students will synthesize the theoretical knowledge gained in lectures by forming collaborative, hands-on lab exercises. Critical thinking skills will be required to evaluate and correct image technical factors.

**Pre-requisite:** Eng 110 and Mat 105  
**Co-requisite:** XRA 112

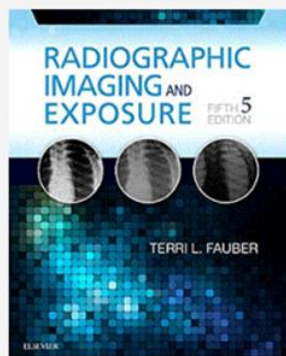
### Course Meetings:

**Lectures: Tuesday & Thursday**

Group I 09:30 – 10:45 am  
Group II 11:00 – 12:15 pm

**Lab: Friday 9:30– 1:45 pm**

**Required Textbooks:**



ISBN-13: 978-0323356244  
ISBN-10: 032335624

The newest edition

**Additional Required Course Materials:**

The following copyrighted materials are the sole property of the instructor. They are available on the instructor's website and are free for students enrolled in this course.

*Radiologic Science I: PPT presentations*

Hostos Community College, Radiologic Technology Program

**Grading Criteria:**

Test 1	10 %	Quiz 1
Test 2	20 %	Midterm Exam
Test 3	10 %	Quiz 2
Test 4	40 %	Final Exam
Test lab	10 %	Lab

A	=	93 – 100
A-	=	90 – 92
B+	=	87 – 89
B	=	83 – 86
B-	=	80 – 82
C+	=	77 – 79
C	=	70 – 76

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<b>D</b>	<b>=</b>	<b>60 – 69</b>	<b>=</b>	<b>Fail</b>
<b>F</b>	<b>=</b>	<b>00 – 59</b>	<b>=</b>	<b>Fail</b>

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**Lecture  
Outline:**

1. Discovery of X-rays. X-ray System and Its Components
2. Making an X-ray Exposure
3. Primary Radiographic Technical Factors: kVp, mA, and Time
4. Basic Digital Image Manipulation
5. Introduction to Computed Radiography (CR)
6. Exposure Indices and Technique Compensation in CR
7. Introduction to Direct Radiography (DR)
8. Exposure Indices and Technique Compensation in DR
9. Inverse Square Law
10. Direct Square Law
11. Direct Square Law Calculations
12. Radiographic Quality: Brightness and Contrast
13. 15% Rule and Effect
14. 15% Rule and Effect Calculations
15. Introduction to Radiographic Grids
16. Grid Calculations and Basic Grid Errors
17. Automatic Exposure Control (AEC) Instrumentation
18. AEC Technique Formulation
19. AEC Scenarios
20. AEC Errors
21. Radiographic Critical Thinking Scenarios 1
22. Radiographic Critical Thinking Scenarios 2

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**Lab  
Outline:**

1. Introduction to the Lab
2. Exploring the X-ray Machine Control Console
3. mAs Reciprocity Law
4. Basic Image Digital Manipulation
5. CR Exposure Index
6. DR Exposure Index
7. Exposure Index and Noise in Digital Imaging
8. Inverse Square Law
9. Direct Square Law
10. The 15% Rule and Effect
11. Scatter Radiation and Grids
12. Basic Grid Errors
13. Introduction Automatic Exposure Control (AEC)
14. Basic AEC Errors

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**Course  
Objectives:**

*Upon completion of the course, students will be able:*

1. List the components of an x-ray tube
2. Explain the X-ray production process
3. Understand the difference between x-ray beam quality and quantity
4. Produce an x-ray exposure and manipulate the three primary technical factors
5. Understand the difference between analog and digital images
6. Identify image artifacts
7. List properties of X-rays
8. Explain the distance terminology
9. Explain the effect of distance on exposure
10. Understand the relationship between distance and mAs
11. Explain the construction of Digital image receptors
12. Manipulate digital images
13. List the components of the CR reader
14. Understand analog processing stages
15. Explain the principle of the X-ray beam collimation
16. Explain the advantages of using a grid
17. Utilize technique charts
18. Explain the principle of the operation of an automatic exposure control
19. Understand the image acquisition process in CR and DR systems
20. Compare and contrast CR and DR systems
21. List digital image characteristics and explain how they affect the radiographic image
22. Manipulate the digital image

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**Teaching  
Methods:**

1. Handouts
  2. PPT presentations
  3. Discussions and demonstrations.
  4. Virtual lab activities
  5. Multimedia demonstrations
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## Classroom Policies:

1. Cell phones and beepers must be turned off or placed on “vibrate” mode in the classroom.
2. Students who arrive after the class has begun should enter the classroom quietly without making any unnecessary noise.
3. Unruly and/or disruptive behavior may be subject to disciplinary action. Students who create a material or substantial interruption of the educational process will be dismissed from the class and referred to the Disciplinary Committee to determine if additional sanctions - including suspension or dismissal from the program - are warranted

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## Student Responsibilities:

*Students are expected to:*

1. Come to class on time
2. Perform all lesson objectives, activities and reading assignments.
3. Complete and hand in all written assignments on or before their due date.
4. Demonstrate proficiency on all homework and written assignments.
5. Demonstrate knowledge and comprehension of the radiographic principles discussed in class and all assigned readings.

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## Use of Electronic Devices:

Cell phone use is not permitted during class time. Cell phones must be placed on “vibrate” mode. Emergency calls must be taken outside the classroom. Cell phones must be placed in a central location away from the testing area during examinations.

**A simple, non-programmable calculator is permitted during examinations;** students may not use – or have in their possession – a programmable calculator, or one that has advanced memory or logarithm functions.



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**Attendance Policies:**

1. All classes are mandatory
  2. If a student is absent from more than 15% of the classes, the instructor may lower the grade or fail the student for excess absences.
  3. **Students who arrive after the lab has begun should enter the laboratory quietly without making any unnecessary noise.**
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**Lateness:**

1. Students are required to come to class on time.
  2. Students who arrive more than 10 minutes late (*after the lab instructions have been explained to the class*) will NOT be permitted to join the lab groups in progress as they cause a significant risk to property, themselves, and others.
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**Academic Integrity:**

Students are responsible for upholding the program's academic integrity by not participating directly or indirectly in acts of cheating and by discouraging others from doing so.

Students' responsibilities include, but are not limited to, the following:

1. No student shall give or receive any assistance or communicate in any way with another student while an examination is in progress.
  2. No student shall use unauthorized notes, books, or other materials during an examination.
  3. No student shall attempt to obtain or disseminate the content of any examination before its distribution by the proctor.
  4. No student shall procure or distribute answers to examinations in advance.
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**Written  
Assignment  
Policies:**

1. Written assignments must be the product of the student's own research.
  2. No student shall submit work that has been written by someone else or copied from an outside source.
  3. No student shall submit work that has been previously submitted in either whole or part for academic credit.  
This is termed "self-plagiarism."
  4. Late assignments may not be accepted; points will be deducted if accepted.
  5. Students who engage in academic dishonesty will receive a grade of zero for the assignment.
  6. All violations of the academic integrity policy shall be referred to the Disciplinary Committee to determine if additional sanctions - including suspension or dismissal from the program - are warranted
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## Examination Policies:

1. No student may remove an exam from the classroom under any circumstances
2. Exams are timed; they must be completed within the stated time frame
3. Students who arrive late for an exam will not receive extra time to complete the exam.
4. No credit will be given for unanswered questions regardless of the reason.
5. Students are responsible for correctly completing all test answer sheets
6. When using a scantron answer sheet, a number “2” pencil must be used to fill in the bubbles.
7. No credit for incompletely erased answers or blanks on a scantron will be given.
8. Make-up exams are not given for quizzes.
9. Make-up exams will only be considered for major exams in extraordinary circumstances that justify special consideration. ***Verifiable documentation is required.***
10. All requests for make-up exams will be determined by the instructor, based upon the merits of the request, on a case-by-case basis. *Submitting a request for a make-up exam does not guarantee that permission will be granted.*
11. If the instructor grants permission for a make-up exam, *it will be scheduled during the week of final exams.*
12. No student will be granted permission for more than one make-up exam for a course; ***a grade of zero will be given for any additional missed exams.***

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## Laboratory Policies:

1. Cell phones and beepers must be turned off or placed in “vibrate” mode.
2. Students who arrive after the lab has begun should enter the laboratory quietly without making any unnecessary noise.
3. Students who arrive more than 10 minutes late (*after the lab instructions have been explained to the class*) will NOT be permitted to join the lab groups in progress as they cause a significant risk to property, themselves, and others.
4. Students must complete all lab homework exercises, activities, and reading assignments.
5. Students must demonstrate proficiency in handling radiographic equipment. This includes but is not limited to, the x-ray table, bucky, ceiling tube mount, control console, automatic film processor, and darkroom.
6. Students' lab assessment will include, but not be limited to, their lab preparation, technique calculations, ability to follow instructions, group participation, verbal communication, lab execution, film critique, and maintenance of their work area and supplies.
7. Evaluation of homework assignments will include the student's ability to demonstrate their knowledge of the radiologic science principles utilized to perform the lab experiment, analysis of their results, their writing skills, and the prompt submission of their work.
8. Unruly and/or disruptive behavior may be subject to disciplinary action. Students who create a material or substantial interruption of the educational process will be dismissed from the lab immediately and referred to the Disciplinary Committee to determine if additional sanctions - including suspension or dismissal from the program - are warranted

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## Students with Disabilities:

Hostos Community College is committed to providing equal educational opportunities to all students, including those with documented disabilities. If you have a disability that may affect your ability to participate in this course or that requires accommodations, you are encouraged to contact the Accessibility Resources Center (ARC). The Director, Raymond Perez, can be reached at RMPEREZ@hostos.cuny.edu or (718-518-4459) as soon as possible.

**Please Note:**

*Students who do not register with the Services for Students with Disabilities office and have their disability verified are not eligible to receive any special accommodations.*