

Fall 2022

## Diagnostic Radiological Physics I

ENU 6657; Section 1C98; 3 Credits

### CLASS MEETING INFO

9:45-10:35 am; Tuesday, Wednesday and Thursday

Location: Communicore Building C2-33

Demo Lab Sessions in lieu of lectures on certain class days at 9:30 am, 11 am or 12:30 pm

Join Zoom Meeting

<https://ufl.zoom.us/j/95052491149?pwd=UXh1MGNyNWZRaHd2dTV5aDFYbTFrdz09>

### CANVAS

[elearning.ufl.edu](http://elearning.ufl.edu) and LOG IN TO E-LEARNING

Lecture slides, homework assignments will be accessed through CANVAS

### INSTRUCTORS

Lynn Rill; [rillln@radiology.ufl.edu](mailto:rillln@radiology.ufl.edu)

Office Hours by arrangement, G-089

Stephanie Leon; [leons@radiology.ufl.edu](mailto:leons@radiology.ufl.edu)

Office Hours by arrangement, G-087

Manuel Arreola; [arreom@radiology.ufl.edu](mailto:arreom@radiology.ufl.edu)

Office Hours by arrangement, G-097

### RESIDENT ASSISTANTS

Mercy Akerele, [make0002@radiology.ufl.edu](mailto:make0002@radiology.ufl.edu)

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EXT.44307, Office Hours by arrangement, G-520

### TEACHING ASSISTANT

Aroon Pressram, [apressram@ufl.edu](mailto:apressram@ufl.edu)

EXT.44307, Office Hours by arrangement, AG-117A

### DESCRIPTION

X-ray production and spectra. Medical imaging concepts and hardware. Clinical overview of diagnostic imaging: radiography, fluoroscopy and mammography. Basic radiation protection principles. Credits:3

### OBJECTIVE

The student will learn the basics and application of projection x-ray imaging, including: x-ray imaging equipment, x-ray production, x-ray interactions within the human body, geometric principles, image receptors, image quality and patient dose. Projection imaging modalities covered in this course will include radiography, fluoroscopy, and mammography.

### PRE-REQUISITES/CO-REQUISITES

None

### REQUIRED TEXTBOOK

The Essential Physics of Medical Imaging, 2020, 4th Edition, by Bushberg, Seibert, Leidholdt Jr. and Boone;

## COURSE SCHEDULE

8/24/22 Lecture 1:	X-Ray Production / LR / Chapters 2,6
8/25/22 Lecture 2:	X-Ray Systems I: X-Ray Tubes / LR / Chapter 6
8/30/22 Lecture 3:	X-Ray Systems II: X-Ray Generators, Power Ratings and Heat / LR / Chapter 6
8/31/22 Lecture 4:	X-Ray Systems III: X-Ray Spectra and Beam Filtration / LR / Chapter 6
9/1/22 Lecture 5:	X-Ray Projection Imaging I: Geometric Principles / MIA / Chapter 7
9/6/22 Lecture 6:	X-Ray Projection Imaging II: Photon Interactions and Subject Contrast / LR / Chapter 3
9/7/22 Demo Lab 1:	mA, time, blur Demo 11:00-12:30 and 1-2:30
9/8/22 Lecture 7:	X-Ray Projection Imaging III: Scattered and Primary Photons, Grids, AEC / LR / Chapter 7
9/13/22 Lecture 8:	X-Ray Detectors: Scintillators and Photoluminescent Phosphors / LR / Chapter 7
9/14/22 Demo Lab 2:	AEC, noise Demo 1-2:30 and 3-4:30
9/15/22 Lecture 9:	General Radiology Clinical Lecture: Eric Thoburn, MD / ET
9/20/22 Quiz 1:	X-ray Systems and Projection Imaging Quiz, Lectures 1-9
9/21/22 Lecture 10:	X-Ray Image Quality I: Image Quality and Dose Tradeoffs (Diagnostic Reference Levels) / LR / Chapter 4
9/21/22 Demo Lab 3:	Radiographic Physics Testing Demo 1-2:30 and 3-4:30
9/22/22 Lecture 11:	Radiography Clinical Exam Performance: Jen Sirera, RT(R),CIIP, BHS/ JS / Chapter 7
9/27/22 Lecture 12:	X-Ray Image Quality II: Image Quality Indicators: Noise, Contrast and Spatial Resolution / MA / Chapter 4
9/28/22 Lecture 13:	X-Ray Image Quality III: Fourier Transforms and Convolutions / MA / Chapter 4
9/29/22 Lecture 14:	X-Ray Image Quality IV: MTF, NPS / MA / Chapter 4
10/4/22 Lecture 15:	X-Ray Image Quality V: DQE / MA / Chapter 4
10/5/22 Lecture 16:	Pediatric Radiology Clinical Lecture: Bob Dubuisson, MD / RD
10/6/22 Lecture 17:	Digital Imaging I: Basic Concepts / LR / Chapter 5
10/11/22 Quiz 2:	Image Quality Quiz, Lectures 10-16
10/12/22 Lecture 18:	Digital Imaging II: Image Processing Algorithms/ LR / Chapter 5
10/13/22 Lecture 19:	Digital Radiography I: Computed and Digital Radiography / LR / Chapter 7
10/18/22 Lecture 20:	Digital Radiography II: Digital Radiography Quality Control/LR/Chapter 7
10/19/22 Lecture 21:	Digital Radiography III: Artifacts in Digital Radiography/ LR / Chapter 7
10/20/22 Lecture 22:	Informatics/ LR/ Chapter
10/25/22 Quiz 3:	Digital Imaging Quiz, Lectures 17-22
10/26/21 Lecture 23:	Fluoroscopy I: Image Intensifiers, Cameras/ LR / Chapter 9
10/27/22 Lecture 24:	Fluoroscopy II: ABC Systems and Fluoroscopic Doses / LR / Chapter 9
11/1/22 Lecture 25:	Fluoroscopy III: Digital Fluoroscopy and DSA / LR /Chapter 9
11/2/22 Demo Lab 4:	Fluoroscopy Demo 1-2:30 and 3-4:30
11/3/22 Lecture 26:	Radiation Sentinel Event and IR Dose Tracking / MIA
11/8/22 Lecture 27:	Radiation Protection I: Review / LR / Chapter 21
11/9/22 Lecture 28:	Radiation Protection II: Radiation Safety / LR / Chapter 21
11/10/22 Lecture 29:	Interventional Clinical Lecture: Sean Wiley, RPA
11/15/22 Quiz 4:	Fluoroscopy Quiz, Lectures 23-29
11/16/22 Lecture 30:	Mammography I / SL / Chapter 8
11/17/22 Lecture 31:	Mammography II / SL / Chapter 8
11/22/22 Lecture 32:	Mammography III / SL / Chapter 8
11/23-25/22	Thanksgiving Holiday
11/29/22 Lecture 33:	Mammography IV / SL / Chapter 8
11/30/22 Lecture 34:	Tomosynthesis / SL / Chapter 8
12/1/22 Lecture 35:	Special Procedures in Mammography / SL / Chapter 8
12/6/22 Demo Lab 5:	Mammography Demo 3-5 pm Springhill
12/7/22 Lecture 36:	Clinical Mammography Lecture: Miriam Hanna, MD
12/8-9/22	Reading Days
12/13/22 Quiz 5:	Mammography Quiz, Lectures 30-36

## ATTENDANCE POLICY; CLASS EXPECTATIONS; MAKE-UP POLICY

Attendance is required. Cell phones should not be used during class. Tardiness and lack of participation in lab sessions will be taken into account in the Participation Grade. Make-up exams may be scheduled in advance by arrangement.

Excused absences must be consistent with university policies in the Graduate Catalog and require appropriate documentation:  
<http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020#attendance>

## EVALUATION OF GRADES

Assignment	Total Points	Percentage of Final Grade
5 quizzes	100	75%
Homework assignments	100	20%
Attendance and Class/ Demo Lab Participation	100	5%
		<b>Total: 100%</b>

## GRADING POLICY

Percent	Grade
93-100	A
90-92	A-
87-89	B+
83-86	B
80-82	B-
77-79	C+
73-76	C
70-72	C-
67-69	D+
63-66	D
60-62	D-
59 & below	E

More information on UF grading policy may be found at: <http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020#grades>

### STUDENTS REQUIRING ACCOMMODATIONS

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565; <https://www.dso.ufl.edu/drc>) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

### EVALUATIONS

Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at <https://evaluations.ufl.edu/evals>. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at <https://evaluations.ufl.edu/results/>.

### UNIVERSITY HONESTY POLICY

UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor Code (<https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

### SOFTWARE USE

All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

### STUDENT PRIVACY

There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see: <http://registrar.ufl.edu/catalog0910/policies/regulationferpa.html>

### CAMPUS RESOURCES

#### Health and Wellness

##### U Matter, We Care

Your well-being is important to the University of Florida. The U Matter, We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another and to

reach out for help if a member of our community is in need. If you or a friend is in distress, please contact [umatter@ufl.edu](mailto:umatter@ufl.edu) so that the U Matter, We Care Team can reach out to the student in distress. A nighttime and weekend crisis counselor is available by phone at 352-392-1575. The U Matter, We Care Team can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call 9-1-1.

**Counseling and Wellness Center**

352-392-1575; <http://www.counseling.ufl.edu/cwc>

**Sexual Assault Recovery Services (SARS)**

352-392-1161; Student Health Care Center

**University Police Department**

352-392-1111 (or 911 for emergencies); <http://www.police.ufl.edu/>

**Academic Resources**

**E-learning Technical Support**

352-392-4357 (select option 2); [learning-support@ufl.edu](mailto:learning-support@ufl.edu); <https://lss.at.ufl.edu/help.shtml>

**Career Resource Center**

Career assistance and counseling.

352-392-1601; Reitz Union; <https://www.crc.ufl.edu/>

**Library Support**

Various ways to receive assistance with respect to using the libraries or finding resources.

<http://cms.uflib.ufl.edu/ask>

**Teaching Center**

General study skills and tutoring.

352-392-2010 or 352-392-6420; Broward Hall; <https://teachingcenter.ufl.edu/>

**Writing Studio**

Help brainstorming, formatting, and writing papers.

352-846-1138; 302 Tigert Hall; <https://writing.ufl.edu/writing-studio/>

**Student Complaints Campus**

[https://www.dso.ufl.edu/documents/UF\\_Complaints\\_policy.pdf](https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf)

**On-Line Students Complaints**

<http://www.distance.ufl.edu/student-complaint-process>