



Fall Semester AY 2023 – 2024	American University of Beirut	
	Faculty of Health Sciences – Division of Health Professions	
	<b>Medical Imaging Sciences Program</b>	
	Course number	<b>MIMG 203</b>
	Course name	<b><i>Medical Imaging Equipment I</i></b>

### Course Administration

Instructor: Dr. Salem Hannoun (Assistant Professor)

Office: 3rd Floor, Van Dyck Hall, Room 329.

Phone Extension: 2964

Office hours: by appointment

Email: [sh156@aub.edu.lb](mailto:sh156@aub.edu.lb)

### Class Time and Venue

Day and Time: Tuesday and Thursday 13:00 pm – 14:15 pm

Location: Van Dyck Hall 332

### Course Description

An introduction to various image-detecting and processing systems; description of analogue and digital detection systems. In depth study of image quality with various factors impacting them. A detailed study of the x-ray tubes with methods of kV, mA, exposure time control, and control of scattered radiation.

### Course Learning Outcomes

At the end of this course the student will be able to:

1. To provide the students with the knowledge of factors which govern and influence the production of the radiographic image.
2. To offer the students an in-depth knowledge and understanding of the x-ray tubes with methods of kV, mA, exposure time control and control of scattered radiation.
3. To acquaint the students with the knowledge of radiographic image processing, analog and digital processing, image receptors, processing procedures and artifacts.
4. To provide the students with the criteria to evaluate radiographs for the proper density, contrast, detail, noise, and artifacts.
5. To acquaint the students with digital and analog receptors and compare their properties.

**Credits Allocated:** 3

**Prerequisites:** MIMG 202

### Course Resources

1. Martin Vosper, Andrew England, & Vicki Major. (2020) Principles and Applications of Radiological Physics. 7<sup>th</sup> ed. Elsevier Health Sciences
2. Stewart C. Bushong. (2020). Radiologic Science for Technologists: Physics, Biology, and Protection. 12<sup>th</sup> ed. Elsevier Health Sciences.
3. Jerrold T. Bushberg, J. Anthony Seibert, Edwin M. Leidholdt, Jr., & John M. Boone. (2020) The Essential Physics of Medical Imaging, 4<sup>th</sup> ed. Lippincott Williams & Wilkins
4. Euclid Seeram. (2019) Digital Radiography Physical Principles and Quality Control, Second Edition. Springer



## Course Outline

Please note this is a tentative schedule. Any changes may be made at the instructor's discretion.

Session's date	Topic	Course Activities	Course Objectives
<b>I-Production of the radiographic image</b>			
<b>Sep-Oct</b>	1. Creation of the Radiographic Image	PPT presentations PDF files on Moodle	1-2
	2. Production of Subject Contrast		
	3. Visibility Qualities of the Image		
	4. Geometrical Qualities of the Image		
	5. Milliampere-Seconds (mAs)		
	6. Kilovoltage-Peak (kVp)		
	7. Generators and Filtration		
	8. Field Size Limitation		
	9. Patient Condition, Pathology, and Contrast Agent		
	10. Scattered Radiation and Grids		
	11. The Anode Bevel and Focal Spot		
	12. Source-to-Image Receptor Distance (SID)		
	13. OID and Distance Ratios		
	14. Alignment and Motion		
	15. Analyzing the Latent Radiographic Image		
	16. Simplifying and Standardizing Technique		
	17. Using Automatic Exposure Controls (AEC)		
<b>TBA</b>	<b>Test 1 =&gt; Chapters 1 - 9</b>		
<b>TBA</b>	<b>Test 2 =&gt; Chapters 10 - 17</b>		
<b>II-Digital radiography</b>			
<b>Nov-Dec</b>	18. Computer Basics	PPT presentations PDF files on Moodle	3-5
	19. Creating the Digital Image		
	20. Digital Image Preprocessing and Processing (Rescaling)		
	21. Digital Image Postprocessing		
	22. Postprocessing Operations in Practice		
	23. Applying Radiographic Technique to Digital Imaging		
	24. Capturing the Digital Image: DR and CR		
	25. Display Systems and Electronic Images		
	26. PACS and Imaging Informatics		
27. Quality Control			
<b>TBA</b>	<b>Test 3 =&gt; Chapters 18 – 27</b>		

## Student Assessment

Assessment	Chapters	Objectives	Percent
<b>Attendance &amp; Participation</b>	-		5%
<b>Assignments</b>	1-27	1-5	15 %
<b>Test 1</b>	1-9	1-2	25 %
<b>Test 2</b>	10-17	1-2	20 %
<b>Test 3</b>	18-27	3-5	35 %

## Course Policies and General Notes

- Attendance:**



- Students are expected to attend all classes and attendance will be taken in each lecture. A student is responsible for the work that is done and for any announcements made during student absence.
- Students who, during a term, miss more than one-fifth of the sessions of any course in the first twelve weeks of the term (six weeks in the case of the summer term) can be dropped from the course. A faculty member who drops a student from the course for this reason must have stated in the syllabus that attendance will be taken.
- Students who withdraw or are dropped for excessive absence from a course receive a grade of "W". Students who do not withdraw or cannot be dropped for excessive absence from a course will receive a grade of 40 (F).

## **2. Academic integrity:**

Education is demanding, and time management is essential. Do not hesitate to use the resources around you but do not cut corners. Cheating and plagiarism will not be tolerated. Please review the Student Code of Conduct in your handbook available on the following web page:

<https://www.aub.edu.lb/sao/Documents/Student%20Handbook%202016-2017.pdf> and familiarize yourself with definitions and penalties (p. 33).

If you're in doubt about what constitutes plagiarism, ask your course instructor(s) because it is your responsibility to know. The American University of Beirut has a strict anti-cheating and anti-plagiarism policy. Penalties include failing marks on the assignment in question, suspension or expulsion from university and a permanent mention of the disciplinary action in the student's records.

By signing up for this course, you confirm that you have read and accepted the terms and provisions of "AUB's Privacy Statement".

## **3. Examinations:**

All written exams must be completed within the time period specified. Students who miss a scheduled examination or quiz must present an excuse considered valid by the instructor of the course. The only delays for the exam that will be considered by the course instructor(s) are for documented illness, death in the family, and personal/family emergency. Unless stated otherwise in the course syllabus, the course instructor should then require the student to take a make-up examination.

Only medical reports issued by an AUB Medical Center (AUBMC) doctor, or by the University Health Services will be accepted. Should there be a question about the validity of any excuse presented by the student, the matter should be referred to the appropriate faculty committee. Instructors should make sure there is no time conflict between an exam and a regularly scheduled course.

## **4. Students with Disabilities:**

AUB strives to make learning experiences accessible for all. If you anticipate or experience academic barriers due to a disability (such as ADHD, learning difficulties, mental health conditions, chronic or temporary medical conditions), please do not hesitate to inform the Accessible Education Office. In order to ensure that you receive the support you need and to facilitate a smooth accommodations process, you must register with the Accessible Education Office (AEO) as soon as possible: [accessibility@aub.edu.lb](mailto:accessibility@aub.edu.lb); [+961-1-350000](tel:+9611350000), x3246; West Hall, 314.

## **5. Non-Discrimination – Title IX – AUB:**

AUB is committed to facilitating a campus free of all forms of discrimination including sex/gender-based harassment prohibited by Title IX. The University's non-discrimination policy applies to, and protects, all students, faculty, and staff. If you think you have experienced discrimination or harassment, including sexual misconduct, we encourage you to tell someone promptly. If you speak to a faculty or staff member about an issue such as harassment, sexual violence, or discrimination, the information will be kept as private as possible, however, faculty and designated staff are required to bring it to the attention of the University's Title IX Coordinator. Faculty can refer you to fully confidential resources, and you can find information and contacts at [www.aub.edu.lb/titleix](http://www.aub.edu.lb/titleix). **To report an incident**, contact the University's Title IX Coordinator Mitra Tauk at 01-350000 ext. 2514, or [titleix@aub.edu.lb](mailto:titleix@aub.edu.lb). An anonymous report may be submitted online via Ethics Point at [www.aub.ethicspoint.com](http://www.aub.ethicspoint.com).