



Spring Semester AY 2023 – 2024	American University of Beirut	
	Faculty of Health Sciences – Division of Health Professions	
	Medical Imaging Sciences Program	
	Course number	MIMG 204
	Course name	Medical Imaging Equipment II

Course Administration

Instructor: Dr. Salem Hannoun (Assistant Professor)

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

Office hours: by appointment

Email: sh156@aub.edu.lb

Class Time and Venue

Tuesday & Thursday 14:00 – 15:15 POST 207

Course Description

A detailed study of the equipment design and function in Breast imaging, Nuclear Medicine / PET, Computed Tomography, Ultrasonography and Magnetic Resonance Imaging.

Course Learning Outcomes

At the end of this course the student will have detailed understanding of the scheme and instrumentation of imaging equipment used in:

1. Understand the principles of Fluoroscopy, Breast imaging, Nuclear Medicine, Computed Tomography, Ultrasonography and Magnetic Resonance Imaging hardware and equipment.
2. Recognize parameters that affect image quality.
3. Recognize parameters that affect radiation dose.
4. Recognize dose reduction techniques.
5. Understand the configuration of detectors in Nuclear Medicine/SPECT/PET equipment.
6. Understand the production of radiopharmaceuticals in Nuclear Medicine/SPECT/PET equipment.
7. Recognize parameters that affect contrast media delivery.
8. Describe the interaction of the sound beam with matter and list the factors that affect it.
9. Describe the construction of a transducer and the function of each part.
10. Describe the technique used to determine two-dimensional Doppler information.
11. Understand the principles of MRI sequence acquisition.

Credits Allocated: **3** **Prerequisites:** **MIMG 203**

Student Assessment

Assessment	CLOs	Percent
1. Attendance & Participation	-	5 %
2. Exam 1	1-3	25 %
3. Exam 2	4	30 %
4. Exam3	5-6	30 %
5. Assignments / Quizzes	4-6	10 %

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	CLOs	
1- Fluoroscopy		Power-point presentations posted on Moodle	1-4	
18 – 23 Jan	Fluoroscopy			
2- Breast Imaging				
25 – 30 Jan	Breast imaging		1-4	
3- Nuclear Medicine / PET:				
01 Feb	Radionuclide properties		1-6	
06 – 08 Feb	Instrumentation			
12 – 16 Feb	Exam 1			
4- Computed Tomography (CT)				
13 Feb	Basic principles of CT		1-4, 7	
15 Feb	Data acquisition			
20 Feb	Image reconstruction			
22 Feb	Image display			
27 Feb	Methods of data acquisition			
29 Feb	Image quality			
05 Mar	Quality assurance			
07 Mar	Post-processing			
11-15 Mar	Exam 2			
5- Ultrasonography				
12 Mar	Physical Principles		1-2, 8-10	
14 Mar	Ultrasound Transducers			
19 – 21 Mar	Imaging Principles and Instrumentation			
26 – 28 Mar	Doppler Imaging Concepts			
6- Magnetic Resonance Imaging				
2 Apr	An overview of MRI		1-2, 7, 11	
4 Apr	Nuclear magnetism: equilibrium & saturation			
9 Apr	RF pulse sequences & MR tissue parameters			
11 Apr **	MR image contrast & Fourier transform			
16 Apr	MRI hardware			
18 Apr	The spatial frequency domain			
23 Apr	The musical score			
25 Apr	MR images			
06 – 10 May	Exam 3			

** April 11 session will be compensated on March 13 and 20 from 2:00-2:50 pm.

Course Resources

1. Mammography Quality Standards Act (MQSA) (<https://www.fda.gov/Radiation-EmittingProducts/MammographyQualityStandardsActandProgram/Regulations/ucm110823.htm>).
2. Bushong, S.C. (2020). Radiologic Science for Technologists (12th ed.). Mosby: Elsevier.
3. Kremkau F.W. (2020). Sonography Principles and Instruments (10th edition). Mosby: Elsevier.
4. Seeram, E. (2022). Computed Tomography-E-Book: Physical Principles, Clinical Applications, and Quality Control. (5th edition). Elsevier Health Sciences.
5. Westbrook, C., & Talbot, J. (2018). MRI in Practice. (5th edition). John Wiley & Sons.
6. Westbrook, C. (2021). Handbook of MRI technique. (5th edition). John Wiley & Sons.

Course Policies and General Notes

1. **Attendance:**



Attendance is mandatory and will be taken in each lecture and lab session. You are expected to attend all classes and participate in classroom activities. If you cannot attend a class, you should notify the instructor beforehand. If you miss a class, it is your responsibility to make up for the material missed and inquire about any announcements made. As per AUB General Regulations, students who miss more than one-fifth of the sessions of any course in the first ten weeks of the semester (five weeks in the case of the summer term) are dropped from the course.

2. Academic integrity:

Education is demanding and you need to properly manage your time. Do not hesitate to use the resources around you but do not cut corners. Cheating and plagiarism will not be tolerated. Review the Student Code of Conduct and familiarize yourself with definitions and penalties. Cheating might earn you a failing mark on the assignment, at the very least. You might fail the course in which you cheated, be warned, suspended or expelled from University and a permanent mention of the disciplinary action might be made in your student records. If you're in doubt about what constitutes plagiarism, ask your instructor because it is *your* responsibility to know. Remember that the American University of Beirut has a strict anti-cheating and anti-plagiarism policy. Do not become a lesson to others. For further information, kindly visit [AUB's Policies and Procedures](#) or check [AUB's student handbook](#).

3. Students with Disabilities:

If you have a disability, for which you may request accommodation in AUB classes, consult the [Accessible Education Office](#) (AEO) website for more information and make arrangements with the Coordinator. Also, please see the instructor of this course privately in regard to possible support services that can be provided to you.

The Accessible Education Office (AEO) coordinates academic accommodations and services for all eligible AUB students with disabilities (such as ADHD, learning difficulties, mental health conditions, chronic or temporary medical conditions, and others). If you have a disability for which you wish to request accommodations at the department, faculty or university level, please contact AEO as soon as possible. Once you register with their office, they will assist you in receiving appropriate accommodations and will liaise with your instructors and any related entity to best support your needs. AEO is located in West Hall room 314, and can be reached by phone at 1-350000 ext. 3246 or by email: accessibility@aub.edu.lb.

4. 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. To report an incident, contact the University's Title IX Coordinator Mitra Tauk at 01-350000 ext. 2514, or titleix@aub.edu.lb. An anonymous report may be submitted online via EthicsPoint at www.aub.ethicspoint.com.

5. Writing:

Written communication is essential for communication, health education and behavioral science. You are expected to proofread and spell-check any written documents before submission. Points will be deducted from the grades for low quality writings. You are encouraged to contact AUB's Writing Center, located in Ada Dodge Hall, 2nd floor or West Hall, 3rd floor. Appointments can be booked online: aub.mywconline.com, over the phone (Ext. 4077) or by walking in.