

Department of Medical Imaging  
Sciences Faculty of Health  
Sciences American University of  
Beirut **Course number:**  
**MIMG203**

Course name: Medical Imaging Equipment I  
Fall semester AY 2019 - 2020

### Course Administration

Instructor: Dr. Charbel Saade (Assistant Professor)  
Office: 3<sup>rd</sup> Floor, Van Dyck - Room 329  
Phone: 2964  
Office hours: by appointment  
Email: cs39@aub.edu.lb

### Class Time and Location

Monday: 12:00 – 13:15 – MIS classroom

Wednesday: 12:00 – 13:15 – MIS classroom

### Course Description

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

### Course Objectives

At the end of this course:

- To provide the students with the knowledge of factors which govern and influence the production of the radiographic image.
- To acquaint the students with the knowledge of radiographic image processing. Description of for the analog and digital processing. Image receptors are introduced. Processing procedures and artifacts are described.
- To provide the students with the criteria to evaluate radiographs for the proper density, contrast, detail, noise and artifacts.
- To acquaint the students with digital and analog receptors and compare their properties.
- 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.

**Credits Allocated: 3**

**Prerequisites: MIMG 202**

### Course Requirements and Student Evaluations

	Assessment	Objectives	Percent
A.	Attendance and Class Contribution		5%
B.	Quiz 1 (Week 5)	X-ray Tube, Failure and Filtration	30 %
C.	Quiz 2 (Week 9)	Computer and Digital Radiography	30 %
D.	Final Exam (Week 14)	Image Quality and Artefacts	35 %

**N.B.:** The passing grade for the course is 70/100

See Appendix 1 for Assignment Outline and Marking Criteria

### General Education Knowledge Goals and Skills

#### General Education Knowledge Goals

1. Communication: Students will communicate effectively in both speech and writing.
2. Technology: Students will use computer systems or other appropriate forms of technology to achieve educational and personal goals.
3. Diversity: Students will understand the importance of a global perspective and culturally diverse peoples.
4. Ethical Reasoning and Action: Students will understand ethical issues and situations.

#### General Education Knowledge Skills

1. Written and Oral Communication in English: Students will communicate effectively in speech and writing and demonstrate proficiency in reading.
2. Critical Thinking and Problem-solving: Students will use critical thinking and problem-solving skills in analyzing information.

3. Ethical Decision-Making: Students will recognize, analyze and assess ethical issues and situations.
4. Computer Literacy: Students will use computers to access, analyze or present information, solve problems, and communicate with others.
5. Collaboration and Cooperation: Students will develop the interpersonal skills required for effective performance in group situations.
6. Intra-Cultural and Inter-Cultural Responsibility: Students will demonstrate an awareness of the responsibilities of intelligent citizenship in a diverse and pluralistic society, and will demonstrate cultural, global, and environmental awareness.

### Detailed Course Outline

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

Date	Topic	Reading
2/9/19	X-ray Tubes	<ol style="list-style-type: none"> <li>1. Graham, D., Cloke, P., &amp; Vosper, M. (2011). Principles and applications of radiological physics. Churchill Livingstone.</li> <li>2. Bushong, S. C. (2013). Radiologic science for technologists-E-book: physics, biology, and protection. Elsevier Health Sciences.</li> </ol>
4/9/19		
9/9/19	X-ray Tube Failure	
11/9/19		
16/9/19	Filtration	
18/9/19		
23/9/19	Films in Radiographic Imaging - 1	
25/9/19		
30/9/19	Films in Radiographic Imaging - 2	
2/10/19		
7/10/19	Computers	
9/10/19		
14/10/19	Computed Radiography	
16/10/19		
21/10/19	Digital Radiography - 1	
23/10/19		
28/10/19	Digital Radiography - 2	
30/10/19		
4/11/19		
6/11/19		
11/11/19	Image Clarity	
13/11/19		
18/11/19	Radiographic Artifacts - 1	
20/11/19		
25/11/19	Radiographic Artifacts - 2	
27/11/19		
2/12/19	Final Exam	

## Bibliography / References

1. Graham, D., Cloke, P., & Vosper, M. (2011). Principles and applications of radiological physics. Churchill Livingstone.
2. Bushong, S. C. (2013). Radiologic science for technologists-E-book: physics, biology, and protection. Elsevier Health Sciences.
3. Bryan, R. N. (Ed.). (2009). Introduction to the science of Medical Imaging. Cambridge University Press.
4. Harisinghani, M. G., Chen, J. W., & Weissleder, R. (2018). Primer of Diagnostic Imaging E-Book. Elsevier Health Sciences.
5. Website: <https://web.stanford.edu/dept/radiology/radiologysite/index.html>
6. Website: [www.MDCT.com.au](http://www.MDCT.com.au)

## Course Policy

1. **Attendance:** Attendance is mandatory and attendance will be taken in each lecture and lab session. You are expected to attend all classes and participate in classroom activities. 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 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 instructor 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.

3. **Missed tests:** All tests must be completed within the time period specified; zero points will be given for an exam if the student does not adhere to the time guidelines. The only delays for the final exam that will be considered by the instructor are for documented illness, death in the family, and personal/family emergency.
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:+961-1-350000), 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 Trudi Hodges at 01-350000 ext. 2514, or [titleix@aub.edu.lb](mailto:titleix@aub.edu.lb). An anonymous report may be submitted online via EthicsPoint at [www.aub.ethicspoint.com](http://www.aub.ethicspoint.com).