



Jordan University of Science and Technology
Faculty of Engineering
Biomedical Engineering Department

BME460 Medical Imaging Systems - JNQF Level: 7

First Semester 2023-2024

Course Catalog

3 Credit Hours. 3 Credit hours (3 h lectures, Department Elective). This course introduces the physics, instrumentation, the diagnostic methods, signal processing methods, image characteristics and the biological effects in X-ray (projection radiography), X-ray computed tomography, nuclear medicine (SPECT/PET), ultrasound imaging, and magnetic resonance imaging.

Text Book

Title	Fundamentals of Medical Imaging
Author(s)	Paul Suetens
Edition	3rd Edition
Short Name	Ref#1
Other Information	

Course References

Short name	Book name	Author(s)	Edition	Other Information
Ref#2	Introduction to biomedical imaging	Andrew Roy Webb, Wiley	2nd Edition	
Textbook	Medical imaging: signals and systems.	J. L. Prince and J. M. Links	2nd Edition	ISBN 0-13-065353-5

Instructor

Name	Dr. Areen Al-Bashir
Office Location	C5 L-1
Office Hours	Sun : 13:00 - 13:30 Mon : 10:00 - 11:30 Mon : 13:00 - 13:30 Tue : 09:30 - 11:30 Wed : 10:00 - 11:30

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Class Schedule & Room

Section 1:
 Lecture Time: Mon, Wed : 11:30 - 13:00
 Room: M2010

Prerequisites

Line Number	Course Name	Prerequisite Type
283110	BME311 Electric Circuits Lab	Prerequisite / Study
283212	BME321 Biomedical Signals And Systems	Prerequisite / Pass

Tentative List of Topics Covered

Weeks	Topic	References
Weeks 1, 2	Overview of various medical imaging modalities (Ch. 1); Review of signals and systems basic concepts (Ch. 2); Image quality metrics (Ch. 3)	
Week 3	Physics of radiography	
Week 4	Projection radiography	
Weeks 5, 6	Computed tomography (CT): Instrumentation; Image reconstruction (Radon transform, back projection, filtered back-projection); Image quality	
Week 6	Digital Radiography	
Week 7	The Physics of Nuclear Medicine	
Week 8	Planar Scintigraphy	
Weeks 9, 10	Emission Computed Tomography	
Week 11	Physics of Ultrasound	
Week 12	Ultrasound Imaging,	
Week 13	Physics of Magnetic Resonance	
Weeks 14, 15	Magnetic Resonance Imaging (MRI) systems: instrumentation, data acquisition, image reconstruction, image quality. Functional MRI	

Mapping of Course Outcomes to Program Outcomes and NQF Outcomes	Course Outcome Weight (Out of 100%)	Assessment method
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Explain the basic principles of x-ray, CT scan, Ultrasound, Nuclear imaging and MRI as an imaging modality [1SO1, 1SO7] [1L7K1, 1L7S1, 1L7S2]	30%	
Analyze the above mentioned imaging systems in terms of physical mechanisms, data generation and acquisition, image construction, processing and quality [1SO1, 1SO2, 1SO4, 1SO6] [1L7K1, 1L7S1]	30%	
List strengths and weaknesses associated with every imaging system studied [1SO1, 1SO2, 1SO3, 1SO4, 1SO6] [1L7C2]	20%	
Encourage Long Life Learning, foster team work and enhance students communication skills. [1SO1, 1SO7] [1L7C1, 1L7C2, 1L7C3, 1L7C4]	20%	

Relationship to Program Student Outcomes (Out of 100%)						
SO1	SO2	SO3	SO4	SO5	SO6	SO7
36.5	11.5	4	11.5		11.5	25

Relationship to NQF Outcomes (Out of 100%)						
L7K1	L7S1	L7S2	L7C1	L7C2	L7C3	L7C4
25	25	10	5	25	5	5

Date Printed: 2023-11-30