EE 472: Biomedical Imaging Systems

COURSE TITLE	*ENGLISH CODE/NO*	*ARABIC CODE/NO*	*CREDIT*			
			Th.	*Pr.*	*Tr.*	*Total*
Biomedical Imaging Systems	EE 472	472 هك	3	1	0	3
Pre-requisites:	EE 302, EE 370					
Course Role in Curriculum	*Required or Elective:*		Required			
	A pre-requisite for:					
Catalogue Description:						
Fundamentals of medical imaging physics and systems: X-ray radiography, ultrasound, radionuclide imaging, and magnetic resonance imaging (MRI). Biological effects of each modality. Tomographical reconstruction principles, including X-ray computed tomography (CT), position emission tomography (PET), and single-photon emission computed tomography (SPECT).						

Textbooks:

1. Peter R. Hoskins, Kevin Martin, Abigail Thrush, *Diagnostic Ultrasound: Physics and Equipment*, 2nd ed., Cambridge University Press, 2010. (ISBN-13: 978-0521757102)
2. Ray Hashman Hashemi, William G. Bradley Jr., Christopher J. Lisanti, *MRI: The Basics*, 3rd ed., Lippincot, Williams and Wilkins, 2010. (ISBN-13: 978-1608311156)
3. Stewart C. Bushong, Geoffrey Clarke, *Magnetic Resonance Imaging: Physical and Biological Principles*, 4th ed., Mosby, 2014. (ISBN-13: 978-0323073547)
4. Stewart C. Bushong, *Radiologic Science for Technologists: Physics, Biology, and Protection*, 10th ed., Mosby, 2012. (ISBN-13: 978-0323081351)
5. William R. Hendee, E. Russell Ritenour, *Medical Imaging Physics*, 4th ed., Wiley-Liss, 2002. (ISBN-13: 978-0471382263)
6. Nadine Barrie Smith, Andrew Webb, *Introduction to Medical Imaging: Physics, Engineering and Clinical Applications*, Cambridge University Press, 2010. (ISBN-13: 978-0521190657)

Supplementary Materials:

1. Course Notes

Course Learning Outcomes:

By the completion of the course the student should be able to:

1. Analyze ultrasound imaging techniques
2. Analyze magnetic resonance imaging techniques
3. Analyze x-ray imaging techniques
4. Analyze CT imaging techniques
5. Analyze nuclear medicine based imaging techniques

Topics to be Covered:	***Duration in Weeks:***
1. Ultrasound imaging	3
2. Magnetic resonance imaging	3
3. X-ray imaging	3
4. Computed Tomography	2.5
5. Nuclear Medicine	2.5

Student Outcomes addressed by the course: (Put a "x" sign)

(a) an ability to apply knowledge of mathematics, science, and engineering	x
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	x
(d) an ability to function on multidisciplinary teams	
(e) an ability to identify, formulate, and solve engineering problems	
(f) an understanding of professional and ethical responsibility	x
(g) an ability to communicate effectively	x
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	
(i) a recognition of the need for, and an ability to engage in life-long learning	
(j) a knowledge of contemporary issues	
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	

Instructor or course coordinator: Prof. Yasser Kadah
Last updated: September 2017

Grading Policy

Class Homework	10%
Major Exams (3)	60%
Projects	0%
Final Exam	30%

Notes:

- Students are allowed to bring 1 sheet of notes to exams / topic (max 5 sheets in final exam)
- Exam style consist of a mix of Multiple Choice Questions (MCQ), True/False Questions, and General Problems.