Department of Physics

College of Science

University of Salahaddin

Medical Imaging Laboratory

Course Book – (4th Year Physics– Applied Branch)

Lecturer's name *MSc Hemn A. Rahman and Jala Ahmed*

Academic Year: 2018/2019

Course Book

1. Course name	Medical Imaging Laboratory
2. Lecturer in charge	MSc Hemn Azeez Rahman
3. Department/ College	College of Science, Physics Department
4. Contact	E-mail: Hemn.rahman@su.edu.krd Website: http:// hemnphy.weebly.com
5. Time (in hours) per week	Practical: 9 hrs
6. Office hours	At least 10 h/week
7. Course code	n/a
8. Teacher's academic profile	I studied for an undergraduate degree in Physics science at Salahaddin University-Erbil between the years of 2007-2011. After graduation in 2011, in the same year, I got a position in Salahaddin University as a laboratory demonstrator. I stayed with the job for more than a year before moving to the United Kingdom in 2013 to study master's degree. In 2014, I obtained MSc in Medical Physics and Clinical Engineering from the University of Liverpool, United Kingdom. The title of my MSc dissertation was about "Experimental and theoretical exploration to find energy and energy distribution of a linear accelerator electron beam". In 2015, I returned to Salahaddin University and got a position as an assistant lecturer.
9. Keywords	N/A

10. Course overview:

The laboratory is about how the medical imaging procedures like CT, MRI and PET/CT scan work and what the physics behind each of the modalities is.

11. Course objective:

At the end of the Lab the student will:

1. Have an understanding of the radiation units quantities
2. Have an understanding of the radiation protections and the devices used for this purpose.
3. Have an idea about of the quality control and quality assurance procedures in medical imaging and medical physics in general.
4. Be familiar with the types of the imaging procedures and the physics behind them.

5. Be familiar with the types basic principles behind each medical imaging procedure.
6. Be aware of the danger of radiation accompanied with the imaging devices.
7. Have a grasp of the interactions between megavoltage electron and photon with human tissue or tissue equivalent materials
8. Have a general understanding of the simulators and the CT simulators
9. Have an appreciation of image reconstruction using computed tomography
10. Appreciate the role of the medical physicist in the management of medical imaging systems, safety aspects and quality assurance.
11. Understand what nuclear medicine is and how to use their knowledge of nuclear physics in nuclear medicine.

12. Student's obligation

Normally, students obliged to attend all the labs and take notes for the lab duration. In addition, in class participation would be a bonus of the students to widen their knowledge and understand the module thoroughly.

Attending the labs regularly would be a crucial point for the students to consider, because the lab materials are very new and very detailed. If the students missed a lab, they would have difficulty to get back on the track.

Additionally, students are ought to submit and their home works and assignments given by their lecturer, because there would be penalties for the late submission. All exams and tests done with books closed, and, students have to take at least one compulsory exams with few class test and quizzes during the years of study. Finally, the students must regularly visit the teachers' website (http:// hemnphy.weebly.com) to keep up with all news and the exam date of the class.

13. Forms of teaching

I am using few unusual ways to make the students engage with the lab. As the lab is very details, using data shows and powering slides would not be enough, so I used the white board too. Before every lab, the students will receive a lecture explaining all about the lab and then the students will be split into groups and do their practical work. I always expect the students to follow the keywords give on the internet to widen their knowledge. In this lab, the students will not receive any

lecture notes so that they need to takes notes during the lab and the presentations held before the lab and further search on the internet. Sometimes I use the technique of Problem Based Learning (PBL).

14. Assessment scheme

1x Two hour written examination	16/40
Final examination	24/60

15. Student learning outcome:

Students who took the lab will be able to find a job in any medical or more specifically an imaging center. With some more training they will be able to work on the devices and x-rays, CT scan, and MRI machines.

16. Course Reading List and References:

N/A

17. The Topics:	Lecturer's name
How x-ray machines work	MSc Hemn A. Rahman Week one Length:9 hours
CT scans	MSc Hemn A. Rahman Week two, three, four Length: 9 hours
MRI scans	MSc Hemn A. Rahman Week five, six, seven Length: 9 hours
PET/CT scans	MSc Hemn A. Rahman Week ten, eleven and twelve Length: 9 hours

19. Examinations:

A sample:

Salahaddin University-Erbil **Name: xxxxxxx**
College of Science, Physics department **Date: xxxxx**
4th Satge Medical Branch **Medical Imaging Lab.**

Answer the following questions:

1. **Why the patients who have implants can not take MRI scan? Explain with an example. (6.0 Marks)**

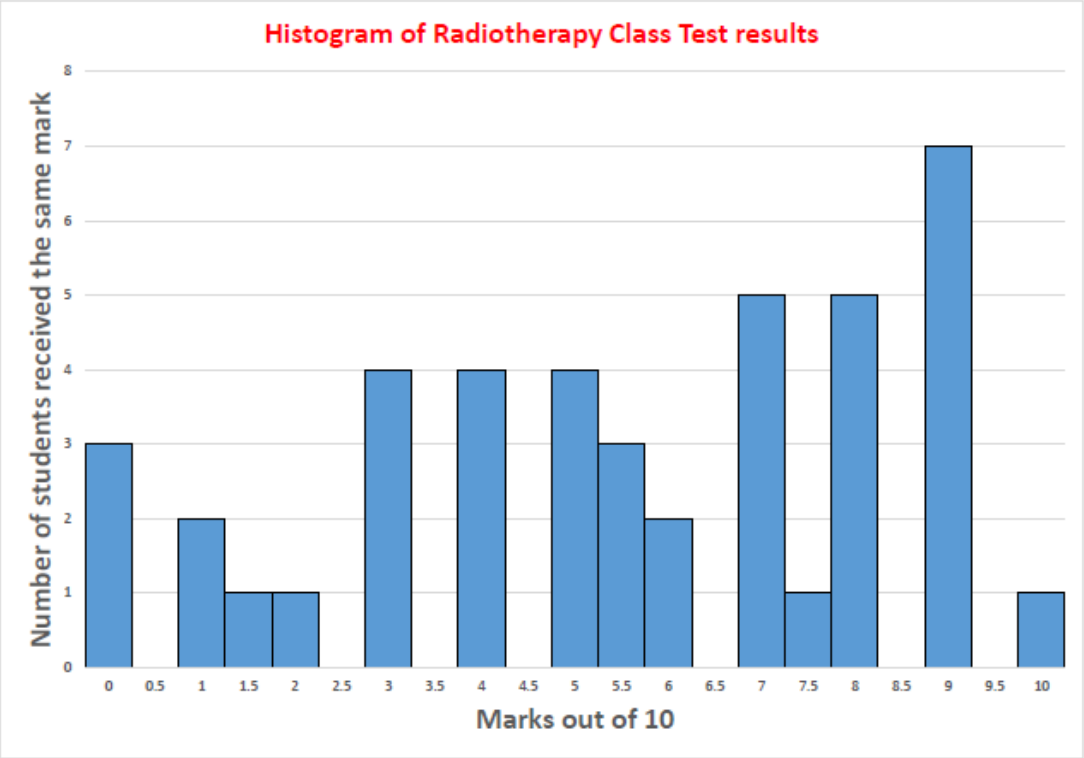
2. **What is the differences between a CT scan and an X-ray machine? (3 points) (6.0 Marks)**

3. **What is the difference between PET/CT and MRI ? (4 points) (4.0 Marks)**

20. Extra notes:

In addition to receiving their marks on the exam papers, students also receive the histogram of the marks, which give an idea on how well the rest of the students performed in the exam. That help the students to find his place between his friends without anyone knows the mark of the other.

Here an example of the Histogram:



The results can be found in this link: https://hemnphy.weebly.com/results.html

21. Peer review

I am MSc Khdr H.Hussien, I confirm that I reviewed Hemn's course content and course book structure. I found his work very interesting; I thinks students will be lucky to have this kind of module in their BSc degree. I had few suggestions, he warmly welcomed my suggestions. Hope him all the best.