



Course Syllabus

Faculty: Faculty of Medicine and Health Sciences
Department: Health Sciences
Program: Radiologic Technology & Medical Imaging

APPROVED

I. General information about the course instructor :							
Name	Dr. Abdullah Taher	Office Hours(3 Hours Weekly)					
Location & phone number	UST- 715989708	Sat	Sun	Mon	Tue	Wed	Thu
Email	Ataher8383@yahoo.com						

II. General information about the course:					
1. Course Title :	Nuclear Medicine Physics				
2. Course Code and Number :	BMI321				
3. Credit Hours :	Credit Hours				Total
	Theoretical	Seminar/Tutorial	Practical	Training	
	2	1			3
4. Study Level and Semester:	3 rd level, 2 nd semester				
5. Pre-requisites (if any):	Radiation physics (2) course.				
6. Co-requisites (if any):	-				
7. Program in which the course is offered:	Radiologic Technology & Medical Imaging				
8. Teaching Language:	English				
9. Instruction location:	UST- Sana'a				

III. Course Description

This course provides student with the principles of nuclear medicine physics as applied to medical imaging and radiation therapy applications.

The course topics cover and focus on nucleus structure, nomenclature and nuclear radiation types, radio nuclides, radiation (particulate and non-particulate), natural and artificial radiation sources, radionuclide production, radioactivity, radiopharmaceutical dose determinations, calculations of radioactive decay, exponential equations, calculation of radiation dosimetry, nuclear radiation

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د. عبدالحبيب ردمان

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interactions with matter, radiation shielding formulation and counting statistics. In addition this course demonstrate the physical aspects of nuclear medicine applications including: scintillation detectors, multichannel analyzers, Gamma camera, SPECT (single photon emission computerized tomography), PET (positron emission tomography), as well as the quality control procedures for Nuclear Medicine instrumentations.

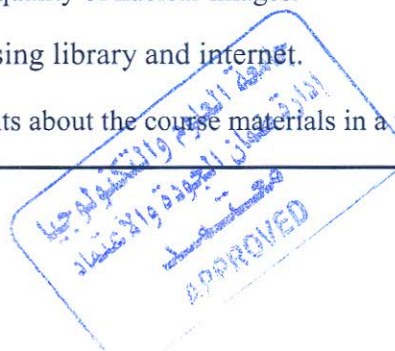
The course carried out using: lectures, self-learning, seminar, applied research, discussion, Brainstorming session, Miniature education, Solve problems, and other activities to teach this course. Evaluation via periodic oral presentation, written assignments, reports, and final written exam.

IV. Course Aims:

1. Demonstrate the basic knowledge of physics related to nuclear medicine concepts.
2. Analyze the effect of nuclear physics parameters on diagnostic and therapeutic procedures .
3. Learn to apply various physics concepts related to nuclear imaging and therapeutic problems.
4. Extend students' knowledge with nuclear medicine physics applications such as gamma camera, SPECT scan, PET scan, and nuclear medicine therapy systems.

V. Course Intended Learning Outcomes (CILOs) :

1. Demonstrate the procedures of radiopharmaceuticals preparation and nuclear medicine imaging.
2. Develop understanding of physical aspects in nuclear medicine applications.
3. Interpret the relations between the physical affecting factors on the work of nuclear medicine applications using physical laws and mathematical equations..
4. Learn to apply scientific roles into nuclear medicine imaging..
5. Gain experience from applying theories solutions in radionuclides dosimetry, and radiation protection.
6. Implement physical principle to improve the quality of nuclear images.
7. Prepare the literature review for reports using library and internet.
8. Manage the tasks regarding doing assignments about the course materials in a team.

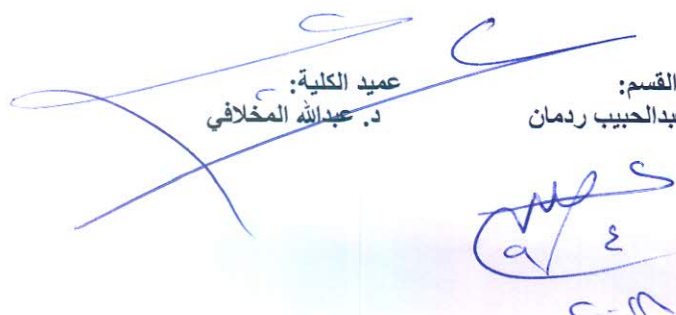


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VI. Course Contents

Theoretical Aspect:				
No.	Course Topics/Units	Sub-topics	No. of Weeks	Contact Hours
1	Ch. 1 Atomic & Nuclear Structure	Atomic structure, Nuclear components, Classification of Nuclei, Binding Energy, radio nuclides, Nuclear radiation (particulate and non-particulate), and Nuclear Stability	2	4
2	Ch. 2 Production of radioisotopes	Nuclear Fission, Radioisotope Generator, cyclotron, technetium-99m generator, isotope calibrator	2	4
3	Ch. 3 Radioactivity	Radioactive decay, Methods of radioactive decay, Decay Schemes, The radioactive decay law, Half-life.	2	4
4	Ch. 4 Interaction of radiation with matter	Alpha particles, Beta particles, Gamma rays, Photoelectric effect, Compton effect, attenuation, Half value layer,	2	4
5	Ch. 5 Radiation Detectors	Gas-Filled Detectors, DC Voltage Dependence, Ionisation Chamber, Scintillation detectors, Photomultiplier Tube, Pulse Height Analysis, Scintillation Spectrometer,	3	6
6	Ch. 6 Nuclear medicine Systems physics	Gamma Camera, Collimation, Emission Tomography, Single Photon Emission Computed Tomography (SPECT), Positron Emission Tomography (PET), Nuclear medicine therapy systems	3	6
Total number of weeks and hours			14	28

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VII. Second: Practical/Tutorial/Clinical Aspects

Write up practical/tutorial/clinical topics

No.	Practical/Tutorial/Clinical topics	No. of Weeks	Contact Hours
1	Binding energy measurements (Tutorial).	2	2
2	Report about Artificial radionuclides used in medicine.	4	2
3	Measurement of radioactivity and half- life for some radionuclides.	6	2
4	Nuclear radiation types and sources.	7	2
5	Mass Attenuation Coefficient measurement.	9	2
6	Attenuation of Gamma-rays parameters	11	2
7	Nuclear radiation dose calibration.	13	2
Total number of weeks and hours		7	14

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