T-104
2022

Course Specification
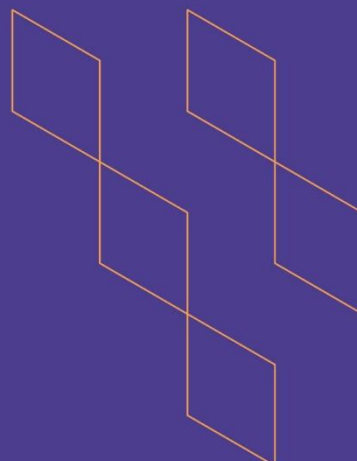
Course Title:	**Nuclear Medicine Physics**
Course Code:	**MPHY6455**
Program:	**Medical Physics**
Department:	**Physics**
College:	**Science**
Institution:	**University of Bisha**
Version:	1
Last Revision Date:	*Pick Revision Date.*

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours:	3

2. Course type

A.	University ☐	College ☐	Department ☒	Track ☐	Others ☐
B.	Required ☐	Elective ☐			

3. Level/year at which this course is offered:	7th Level / 4th year

4. Course general Description

This course describes the use of radionuclides in medicine for diagnosis, staging of disease, therapy and monitoring the response of a disease process. It covers the physics of nuclear medicine, clinicians, radiochemists and medical technologists who would like to familiarize themselves with the basic concepts and practice of nuclear medicine physics. Moreover, the course includes imaging instrumentation by gamma-camera, image processing and reconstruction, data analysis, radionuclide production, radionuclide therapy and radiopharmacy.

5. Pre-requirements for this course (if any):

MPHY26351

6. Co- requirements for this course (if any):

NA

7. Course Main Objective(s)

Recognize the study and utilization of radioactive compounds in nuclear medicine to image and treat human disease.

1. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1.	Traditional classroom	3	100%
2.	E-learning		
3.	Hybrid • Traditional classroom • E-learning		
4.	Distance learning		

2. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	45
2.	Laboratory/Studio	
3.	Field	
4.	Tutorial	

5.	Others (specify)		
	Total		40

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	Recognize the principles of the production of **Radionuclide and Radiopharmacy**	K2	Lecturing	Quizzes Homework Midterm exam Final exam
1.2	Recognize the **basic radiation detectors to obtain digital image by gamma camera**	K2		
2.0	Skills			
2.1	Solve problems related to nuclear medicine	S1	Solve problems. Self-learning	Quizzes Homework Midterm exam Final exam
2.2	Illustrate the Generic Performance of the Nuclear Medicine image	S1	Solve problems. Self-learning	Quizzes Homework Midterm exam Final exam
2.3	Communicate positively with others.	S4	Presentation Work group	Reports Presentation
3.0	Values, autonomy, and responsibility			
3.1	Exhibit self-learning skills independently.	V2	Self-learning	Reports Presentation
3.2	Ability to work in team effectively.	V3	Work group	Reports Presentation

C. Course Content

No	radioNuclide ProducTioN	Contact Hours
1.	**Radionuclide Production** The origins of different nuclei reactor Production	5
2.	**Radionuclide Production** accelerator production radionuclide generators radiochemistry of irradiated targets	4
3.	**Physics in the radiopharmacy** shielding for radionuclides designing a radiopharmacy security of the radiopharmacy record keeping	5
4.	**basic radiation detectors** introduction Gas filled detector scintillation detectors and storage Phosphors	4
.5	**Electronics related to Nuclear Medicine imaging devices** primary radiation detection Processes imaging detectors' signal amplification signal Processing other electronic required by imaging systems	5
6	**Generic Performance Measures** intrinsic and extrinsic measures energy resolution spatial resolution Temporal resolution sensitivity image Quality	5
7.	**Nuclear Medicine imaging devices** Gamma camera systems PET systems SPECT/CT and PET/CT systems	4

8	**computers in Nuclear Medicine** Phenomenal increase in computing capabilities storing images on a computer image Processing data acquisition file format information system	5
9	**image reconstruction** analytical reconstruction iterative reconstruction Noise estimation	4
10.	**Nuclear Medicine image display** digital image display and Visual Perception display device hardware Grey scale display color display Visualization of Volume data Display Monitor Quality assurance	4
Total		45

Table: The matrix of consistency between the content and the learning outcomes of the course.

	Course Learning Outcomes						
	1.1	1.2	2.1	2.2	2.3	3.1	3.2
Topic 1	√		√		√	√	√
Topic 2	√		√		√	√	√
Topic 3	√		√		√	√	√
Topic 4		√	√	√	√	√	√
Topic 5		√	√	√	√	√	√
Topic 6		√	√	√	√	√	√
Topic 7		√	√	√	√	√	√
Topic 8		√	√	√	√	√	√
Topic 9		√	√	√	√	√	√
Topic 10		√	√	√	√	√	√

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Homework, quizzes, reports, and presentation.	1: 15	10 %
2.	First term exam	7: 8	20 %
3.	Second term exam	12:13	20 %
4.	Final exam	End of Semester	50 %

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.)

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	- Nuclear Medicine Physics: a handbook for Teachers and students, international atomic energy agency Vienna, 2014. -Nuclear Medicine Physics, the basics, Ramesh Chandra, Arman Rahmim, Philadelphia: Wolters Kluwer Health, Ed. 8, 2018.
Supportive References	Physics and Radiobiology of Nuclear Medicine, Gopal B. Saha Third Edition, Springer, 2006.
Electronic Materials	- Blackboard. - PowerPoint presentations. - Digital library of University of Bisha https://ub.deepknowledge.io/Bisha
Other Learning Materials	NA

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms
Technology equipment (projector, smart board, software)	Projector or smart board
Other equipment (depending on the nature of the specialty)	NA

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students.	Indirect (Questionnaire).
Effectiveness of students assessment	Students, Staff members, Program Leader.	Indirect (Questionnaire).
	Peer Reviewer.	Direct (Review exam)
Quality of learning resources	Students, Staff members, Program Leaders.	Indirect (Questionnaire).
The extent to which CLOs have been achieved	Students, Staff members, Program Leader.	Indirect (Questionnaire).
	Course coordinator.	Direct (Course Learning Outcomes Assessment).

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods (Direct, Indirect)

G. Specification Approval Data

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	