Syllabus*: Nuclear Medicine (140508324)

First/Second Semester 2022- /2023

COURSE INFORMATION	
Course Name: Nuclear Medicine **Semester:** **Department:** Department of Medical Imaging **Faculty:**	**Course Code:** **140508324** **Section:** **Core Curriculum**:
Day(s) and Time(s): Monday: 14:00-15:15 Wednesday: 14:00-15:15 **Classroom:** Microsoft Teams	**Credit Hours: 3 (2 Theory + 3 Lab hours)** **Prerequisites**: 140508213

COURSE DESCRIPTION

Nuclear Medicine Imaging (NMI or NM) is a major branch of Medical Imaging Systems. There are three main NMI devices. These are the Gamma Camera (Planner NM Imaging), the Single Photon Emission Computerized Tomography SPECT, and the Positron Emission Tomography PET. These systems observe the distribution of a radiopharmaceutical within human. The resulting NM images give clinical information about certain functions of human organs. This matter is not available, or is not easily available by other medical imaging modalities such as CT and MRI.

The course describes basic concepts of NM imaging instrumentation (Gamma Camera, SPECT, PET). Also, it provides explanation of aspects related to radiopharmaceuticals including the processes of production, localization, uptake, and clearance. Then the course moves to explain the common clinical applications. The valuable diagnostic information of these applications is emphasised. This include the clinical significance of heart, kidney, thyroid, brain, bone examinations. Finally, the course gives details about the major advances in both the radiopharmaceuticals and instr

DELIVERY METHODS

The course will be delivered through a combination of active learning strategies. These will include:

- PowerPoint lectures and active classroom based discussion
- Collaborative learning through small groups acting in an interdisciplinary context.
- Relevant films and documentaries
- Video lectures
- E-learning resources: e-reading assignments and practice quizzes through Model and Microsoft Team

FACULTY INFORMATION	
Name	
Academic Title:	**Assistance Professor**
Office Location:	36 عط
Telephone Number:	
Email Address:	kholouds@hu.edu.jo
Office Hours:	**Monday** 9.20-10.20 **Wednesday** 9.20-10.20 *Please send an e-mail (kholouds@hu.edu.jo) to meet at any other time.*

REFERENCES AND LEARNING RESOURCES

Required Textbook:

Nuclear Medicine and PET/CT: Technology and Techniques, Paul E. Christian, Kristen M. Waterstram-Rich. 7th Ed., 2011. Published By: Elsevier Science.

Practical Nuclear Medicine, By P.F. Sharp, H.G. Gemmell and F. W.Smith, 3rd Ed., 2005. Published By: Oxford Medical Public.

Suggested Additional Resources:

The essential physics of Medical Imaging. By: Bushong J., Seibert J., Leidholdt E., and Boone J. 3rd Ed., 2012. Published By LWW

Physics and Radiobiology of Nuclear Medicine, By: B.Saha, 3rd Ed., 2010. Published By: Springer.

Useful Web Resources: http://www.

STUDENT LEARNING OUTCOMES MATRIX*

Core Curriculum Learning Outcomes	Program Learning Outcomes	Course Objectives	Course Student Learning Outcomes	Assessment Method
Think critically and creatively in a variety of methods in order to make decisions and solve problems.		Introduction to nuclear medicine imaging	• How does NM Imaging Procedure Work? • Radiopharmaceuticals: Function-Characteristics-Localization- Production	• Exams • Quizzes
		Nuclear Medicine Imaging Systems	Gamma Camera Gamma Camera Concepts and Instrumentation Data Acquisition in NM Imaging, Image Filtering. SPECT o Principle and Basic Instrumentation in SPECT PET o Principle & Basic Instrumentation in PET The PET/CT and SPECT/CT Imager o Principle & Basic Instrumentation	• Exams
		Radiopharmacy	Radiopharmacy Design Production of Radiopharmaceuticals	• Exams • Quizzes
		Central Nervous System	• Radiopharmaceuticals • Nuclear Medicine protocols	• Exams • Quizzes

Communicate competently with others using oral and written English skills		Endocrine System	• Radiopharmaceuticals • Nuclear Medicine protocols	• Exams • Quizzes

Demonstrate competency in the use of research skills and various information sources. Identify the general concepts of humanities and natural sciences in a manner that reveals their value in life.				
		Respiratory System	• Radiopharmaceuticals • Nuclear Medicine protocols	

		Cardiovascular System	• Radiopharmaceuticals • Nuclear Medicine protocols	
		Gastrointestinal System	• Radiopharmaceuticals • Nuclear Medicine protocols	

		Genitourinary System	• Radiopharmaceuticals • Nuclear Medicine protocols	
		Clinical PET/CT in Oncology	• Intracellular 18F-FDG Metabolism • Patient Preparation and Injection • PET Oncology Main Applications	

ACADEMIC SUPPORT

It is The Hashemite University policy to provide educational opportunities that ensure fair, appropriate and reasonable accommodation to students who have disabilities that may affect their ability to participate in course activities or meet course requirements. Students with disabilities are encouraged to contact their Instructor to ensure that their individual needs are met. The University through its Special Need section will exert all efforts to accommodate for individual's needs.

Special Needs Section:

Tel:

Location:
Email:

COURSE REGULATIONS

Participation

Class participation and attendance are important elements of every student's learning experience at The Hashemite University, and the student is expected to attend all classes. A student should not miss more than 15% of the classes during a semester. *Those exceeding this limit of 15% will receive a failing grade regardless of their performance*. It is a student's responsibility to monitor the frequency of their own absences. **Attendance record begins on the first day of class irrespective of the period allotted to drop/add and late registration. It is a student's responsibility to sign-in; failure to do so will result in a non-attendance being recorded.**

In exceptional cases, the student, with the instructor's prior permission, could be exempted from attending a class provided that the number of such occasions does not exceed the limit allowed by the University. The instructor will determine the acceptability of an absence for being absent. A student who misses more than 25% of classes and has a valid excuse for being absent will be allowed to withdraw from the course.

Plagiarism

Plagiarism is considered a serious academic offence and can result in your work losing marks or being failed. HU expects its students to adopt and abide by the highest standards of conduct in their interaction with their professors, peers, and the wider University community. As such, a student is expected not to engage in behaviours that compromise his/her own integrity as well as that of the Hashemite University.

Plagiarism includes the following examples and it applies to all student assignments or submitted work:

- **Use of the work, ideas, images or words of someone else without his/her permission or reference to them.**
- **Use of someone else's wording, name, phrase, sentence, paragraph or essay without using quotation marks.**
- **Misrepresentation of the sources that were used.**

The instructor has the right to fail the coursework or deduct marks where plagiarism is detected

Late or Missed Assignments

In all cases of assessment, students who fails to attend an exam, class project or deliver a presentation on the scheduled date without prior permission, and/or are unable to provide a medical note, will automatically receive a fail grade for this part of the assessment.

- Submitting a term paper on time is a key part of the assessment process. Students who fail to submit their work by the deadline specified will automatically receive a 10% penalty. Assignments handed in more than 24 hours late will receive a further 10% penalty. Each subsequent 24 hours will result in a further 10% penalty.
- In cases where a student misses an assessment on account of a medical reason or with prior permission; in line with University regulations an incomplete grade for the specific assessment will be awarded and an alternative assessment or extension can be arranged.

Student Complaints Policy

Students at The Hashemite University have the right to pursue complaints related to faculty, staff, and other students. The nature of the complaints may be either academic or non-academic. For more information about the policy and processes related to this policy, you may refer to the students' handbook.

COURSE ASSESSMENT

Course Calendar and Assessment

Students will be graded through the following means of assessment and their final grade will be calculated from the forms of assessment as listed below with their grade weighting taken into account. The criteria for grading are listed at the end of the syllabus

Assessment	Grade Weighting	Deadline Assessment
First Exam	25%	
Second Exam	25%	
Quizzes	10%	
Homework		
Final Exam	40%	

Description of Exams

Test questions will predominately come from material presented in the lectures. Semester exams will be conducted during the regularly scheduled lecture period. Exam will consist of a combination of multiple choice, short answer, match, true and false and/or descriptive questions.

Homework: Will be given for each chapter, while the chapter in progress you are supposed to work on them continuously and submit in next lecture when I finish the chapter.

You are also expected to work on in-chapter examples, self-tests and representative number of end of chapter problems. The answers of self-tests and end of chapter exercises are given at the end of the book.

Quizzes: Unannounced quizzes will be given during or/and at the end of each chapter based upon the previous lectures. It will enforce that you come prepared to the class.

No make-up exams, homework or quizzes will be given. Only documented absences will be considered as per HU guidelines.

Grades are not negotiable and are awarded according to the following criteria*:

Letter Grade	Description	Grade Points
A+	Excellent	4.00
A		3.75
A-		3.50
B+	Very Good	3.25
B		3.00
B-		2.75
C+	Good	2.50
C		2.25
C-		2.00
D+	Pass	1.75
D	Pass	1.50
F	Fail	0.00
I	Incomplete	-

WEEKLY LECTURE SCHEDULE AND CONTENT DISTRIBUTION

مثال على التوزيع : مساق الفيزياء العامة 101

"Lecture hours and weeks are approximate and may change as needed"

Note: For Nuclear Medicine with 2 lecture periods per week (S/T, M/W or T/R), one lecture period covers 1.5 lecture hours (80 minutes). The course content specifies the sections in chapters 1-10 of the textbook that will be included in quizzes, homework and exams.

Chapter 1	***Introduction to nuclear medicine imaging***	**Week 1**	**2 lecture hours**
Chapter 2	***Gamma Camera***	**Week 2**	**2 lecture hours**
Chapter 2	***SPECT***	**Week 3**	**2 lecture hours**
Chapter 2	***PET***	**Week 4**	**2 lecture hours**
Chapter 2	***The PET/CT and SPECT/CT* Imager**	**Week 5**	**2 lecture hours**
Chapter 3	**Radiopharmacy**	**Week 6-7**	**4 lecture hours**
Chapter 4	**Central Nervous System**	**Week 8**	**2 lecture hours**
Chapter 5	**Endocrine System**	**Week 9**	**2 lecture hours**

Chapter 6	**Respiratory System**	**Week 10**	**2 lecture hours**
Chapter 7	**Cardiovascular System**	**Week 11**	**2 lecture hours**
Chapter 8	**Gastrointestinal System**	**Week 12**	**2 lecture hours**
Chapter 9	**Genitourinary System**	**Week 13**	**2 lecture hours**
Chapter 10	***Clinical PET/CT in Oncology***	***Week 14***	***2 lecture hours***
Review		***Week 15***	**2 lecture hours**
University Exams		***Week 16***	

ASSESSMENT RUBRICS					
Classroom Participation: Oral Presentation					
Classroom Participation: Assessment Criteria					
Criteria	**Quality**				**Score**
	Excellent (4 points)	**Good (3 points)**	**Satisfactory (2 points)**	**Needs Improvement (1 points)**	
Degree to which student integrates course readings into classroom participation	- often cites from readings; - uses readings to support points; - often articulates "fit" of readings with topic at hand.	-occasionally cites from readings; - sometimes uses readings to support points; -occasionally articulates "fit" of readings with topic at hand .	-rarely able to cite from readings; - rarely uses readings to support points; - rarely articulates "fit" of readings with topic at hand	-unable to cite from readings; -cannot use readings to support points; cannot articulates "fit" of readings with topic at hand .	
Interaction / participation in classroom discussions	-always a willing participant, responds frequently to questions; - routinely volunteers point of view .	-often a willing participant, - responds occasionally to questions; - occasionally volunteers point of view .	-rarely a willing participant, - rarely able to respond to questions; - rarely volunteers point of view .	-never a willing participant., - never able to respond to questions; - never volunteers point of view .	
Interaction /participation in classroom learning activities	-always a willing participant; -acts appropriately during all role plays; - responds frequently to questions; - routinely volunteers point of view.	-often a willing participant; -acts appropriately during role plays; - responds occasionally to questions; -occasionally volunteers point of view.	-rarely a willing participant. -occasionally acts inappropriately during role plays; - rarely able to respond to direct questions; -rarely volunteers point of view .	-never a willing participant - often acts inappropriately during role plays;, - never able to respond to direct questions; - never volunteers point of view.	
Demonstration of professional attitude and demeanor	-always demonstrates commitment through thorough preparation; - always arrives on time; - often solicits instructors' perspective outside class.	- rarely unprepared; rarely arrives late; - occasionally solicits instructors' perspective outside class .	-often unprepared; occasionally arrives late; - rarely solicits instructors' perspective outside class .	-rarely prepared; - often arrives late; -never solicits instructors' perspective outside class	

Assessment Rubrics to be determined by the department. Add samples below.

Element	Excellent			Satisfactory			Needs Improvement			Points
	8	7	6	5	4	3	2	1	0	
Organization	▪ There is a logical sequence of information. ▪ Title slide and closing slide are included appropriately.			▪ There is some logical sequence of information. ▪ Title slide and closing slides are included.			▪ There is little or no logical sequence of information. ▪ Title slide and/ or closing slides are not included.			
Slide Design (text, colors, background, illustrations, size, titles, subtitles)	▪ Presentation is attractive and appealing to viewers.			▪ Presentation is somewhat appealing to viewers.			▪ Little to no attempt has been made to make presentation appealing to viewers.			
Content	▪ Presentation covers topic completely and in depth. ▪ Information is clear, appropriate, and accurate.			▪ Presentation includes some essential information. ▪ Some information is somewhat confusing, incorrect, or flawed.			▪ Presentation includes little essential information. ▪ Information is confusing, inaccurate, or flawed.			
Language	▪ Spelling, grammar, usage, and punctuation are accurate ▪ Fluent and effective			▪ There are minor problems in spelling, grammar, usage, and/or punctuation.			▪ There are persistent errors in spelling, grammar, usage, and/or punctuation. ▪ Less or not fluent and effective.			
Delivery	▪ Ideas were communicated with enthusiasm, proper voice projection and clear delivery. ▪ There was sufficient eye contact with audience. ▪ There were sufficient use of other non-verbal communication skills. ▪ Appropriate delivery pace was used.			▪ There was some difficulty communicating ideas due to voice projection, lack of preparation, incomplete work, and/or insufficient eye contact. ▪ Insufficient use of non-verbal communication skills. ▪ Delivery pace is somewhat appropriate.			▪ There was great difficulty communicating ideas due to poor voice projection, lack of preparation, incomplete work, and/or little or no eye contact. ▪ No use of non verbal communication skills. ▪ Inappropriate delivery pace was used.			
Interaction with Audience	▪ Answers to questions are coherent and complete. ▪ Answers demonstrate confidence and extensive			▪ Most answers to questions are coherent and complete. ▪ Answers somehow demonstrate confidence and			▪ Answers to questions are neither coherent nor complete. ▪ Is tentative or unclear in			

	knowledge.	extensive knowledge.	responses.	
	Total Score (Y x 5/16) =			