Course Unit Title	Radiology Physics
Course Unit Code	BME350
Type of Course Unit	Compulsory
Level of Course Unit	Freshman
National Credits	3
Number of ECTS Credits Allocated	5
Theoretical (hour/week)	3
Practice (hour/week)	-
Laboratory (hour/biweekly)	-
Year of Study	3
Semester when the course unit is delivered	2
Course Coordinator	Assist. Prof. Dr. Dilber Uzun Özşahin
Name of Lecturer (s)	Tolga Fuatlı
Name of Assistant (s)	-
Mode of Delivery	Face to Face.
Language of Instruction	English
Prerequisites	-
Recommended Optional Programme Components	-

Course description:

This course covers the essential physics of radiological imaging modalities. The main topics; radiation and the atom, interaction of radiation with matter, X-ray production, X-ray tubes, nuclear magnetic resonance, magnetization properties, characteristics of ultrasound, interactions of ultrasound with matter, radioactivity and nuclear transformation, radionuclide production and radiopharmaceuticals, radiation detection, radiation protection, dosimeter and radiation biology.

Objectives of the Course:

- Understand structure of atom and production of radiation
- Understand principles of imaging techniques such as X-ray imaging, MRI and Ultrasound imaging
- Provide knowledge of Nuclear Medicine and radiation

Learning Outcomes		
At the end of the course the student should be able to		Assessment
1	Define the radiation and its types	1,5
2	Define the interaction of radiation with matter	1,5
3	Calculate radiation related parameters	1,5
4	Know production mechanism of x-ray	1,5
5	Define Nuclear magnetic resonance physics	1,5
6	Have knowledge of ultrasound imaging physics	1,5
7	Define nuclear medicine imaging physics	1,3,5
Assessment Methods: 1. Written Exam, 2. Assignment, 3. Project/Report, 4. Presentation, 5. Lab. Work		

Course's Contribution to Program		
		CL
1	Apply knowledge of mathematics, natural science with relevant to life science and multidisciplinary context of engineering science.	4
2	Analyze, design and conduct experiments, as well as to analyze and interpret data.	4
3	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.	3
4	Function on multidisciplinary teams.	3
5	Control in design work, by using simulation, modelling and tests and integration in a problem solving oriented way.	3
6	Display an understanding of professional and ethical responsibility.	3
7	Communicate effectively aware of the non-technical effects of engineering.	2
8	Search technical literature and other information sources.	2
9	Recognize of the need for, and an ability to engage in life-long learning.	1
10	Exhibit a knowledge of contemporary issues.	2

11	Use the techniques, skills and modern engineering tools necessary for engineering practice to develop marketable products for the global market.	3

CL: Contribution Level (1: Very Low, 2: Low, 3: Moderate, 4: High, 5: Very High)

Course Contents

Week	Chapter	Topics	Exam
1	1	General Discussion, Introduction	
2	1,2	Radiation and The Atom	
3	2	Interaction of Radiation with Matter – I	
4	3	Interaction of Radiation with Matter – II	
5	5	Production of X-rays	
6	5	Nuclear Magnetic Resonance – I	
7	6	Nuclear Magnetic Resonance - II	
8			Midterm
9	7	Ultrasound Physics	
10	8	Radioactivity	
11	8	Radionuclide Production and Radipharmaceuticals	
12	9	Radiation Detection and Measurement	
13	9	Radiation Protection	
14	13	Radiation Dosimetry of the Patient, Radiation Biology	
15			Final

Recommended Sources

Textbook:

The Essential Physics of Medical Imaging, 2nd edition, Jerrold T. Bushberg, J. Antony Seibert, Edwin M. Leidholdt, John M. Boone, Lippincott Williams & Wilkins, 2002.

Medical Imaging Physics, 4th edition, William R. Hende, E. Russell Ritenour, Wiley-Liss, 2002.

Assessment		
Attendance	5%	
Quiz	20%	
Homework	10%	
Midterm Exam	30%	Written Exam
Final Exam	35%	Written Exam
Total	100%	

Assessment Criteria

Final grades are determined according to the Near East University Academic Regulations for Undergraduate Studies

Course Policies

1. Attendance to the course is mandatory.
2. Students may use calculators during the exam.
3. Cheating and plagiarism will not be tolerated. Cheating will be penalized according to the Near East University General Student Discipline Regulations.

ECTS allocated based on Student Workload

Activities	Number	Duration (hour)	Total Workload(hour)
Course duration in class (including Exam weeks)	16	3	48
Labs and Tutorials	3	2	6
Assignment	-	-	-
Project/Presentation/Report	2	2	4
E-learning activities	-	-	-
Quizzes	-	-	-
Midterm Examination	1	15	15
Final Examination	1	20	20
Self Study	14	5	70
Total Workload			163

Total Workload/30(h)	5.43
ECTS Credit of the Course	5