Faculty of Medicine

Major: Doctor of Medicine

Academic Year: 2023/2024

Subject: Medical Physics

COURSE SYLLABUS

Student's Copy

1. <u>Course information:</u>

Theory		Practical	
Course Title:	Medical Physics	**Course Title:**	
Course Code:	1002131	**Course Code:**	
Co-Requisite:	-	**Co-Requisite:**	
Prerequisite:	-	**Prerequisite:**	
Course Credit Hours:	2	**Course Credit Hours:**	
Class Location:		**Class Location:**	
Department:		Medicine	
Final Qualification:			

2. <u>Instructor Contact Information:</u>

Coordinator:	Taqwa Jamal Khaled Aqel
Instructor(s):	Taqwa Jamal Khaled Aqel
Email:	
Office:	
Office Hours:	Saturday, Sunday, Monday, Tuesday, Wednesday, Thursday (1-3)pm

3. Course Description:

The Medical physics course introduces the students to converting units and describing motion in one dimension mainly average and instantaneous velocity and acceleration. After that the students will understand the mechanical aspects of physics such as force, gravitation, Newton's first and third laws, Newton's second law, and Friction. Work and energy including kinetic energy, work-energy principle, gravitational potential energy, conservative and nonconservative forces and mechanical energy. Students will learn about Fluid mechanics including pressure in fluids, Atmospheric and Gauge pressure, Pascal's principle, Archimedes' Principle, Continuity Equation, Streamline Flow, and Bernoulli's Equation also flow in tubes: Poiseuille's Equation, Blood Flow will be presented. Light including the index of reflection, and refraction, total internal reflection principles and the Fiber optics will be given. And in geometric optics the student will learn about the thin lenses, ray tracing and the thin lenses equation. The students will be faced to the nuclear physics and radioactivity to understand the structure and properties of nucleus, radioactivity, half-life, dating in archaeology and geology, radioactive decays as part of their knowledge in physical phenomena. Nuclear energy effects and uses of radiation will also be explained including the interaction radiation with matter, biological damage, radiation units, radiation therapy, finally the student will learn about the radiation applications in medicine.

4. Resources Available to Students:

Main text book:
Physics: Principles with Applications, Douglas Giancoli, 7th Edition.

Subsidiary books:

 1. Fundamental of Physics, by David Halliday , Robert Resnick ,and Jearl Walker , 5 th Edition , John Wiley and Sons , 1995.
2. Physics for Scientists and Engineers, by Lawrence S. Lerner , Jones and Bartlett Publishing , 1996.
3. University Physics: Models and Applications by W.P Curmett and A.P Western NCP Publishers 1994.

5. Teaching Methods
   a. Lectures.
   b. Discussion and problem solving.
   c. Individual and groups activities.
   d. In- class coopetition.

6. <u>Intended Learning Outcomes (ILOs):</u>

Upon successful completion of this course students will be able to …

1. Understand simple vector analysis and apply it to: one dimensional motion, Newton's laws of motion.
2. Demonstrate knowledge of (kinetic and potential) energy and its relation to work.
3. Be able to calculate the power output of individuals.
4. Understand basic principles of fluid dynamics and relate it to the medical applications.
5. Understand basic principles of light: Index of Refraction, Refraction: Snell's Law, Total Internal Reflection; Fiber Optics, Thin Lenses; Ray Tracing, The Thin Lens Equation.
6. Define ionizing nuclear radiation in their nature and their benefit and harmfulness in human life.
7. Understand radiation units and assess dangers due to radiation exposure and study some medical applications of radiation.

7. <u>Course Policies:</u>

To be explained to students at the first meeting:
1. **Attendance Policies:**

A. Attendance Policy (absences and tardiness for a traditional course):
   a. Students must attend all classes of this course.
   b. Any student with an absence of 15% of the classes of any course, will be illegible to sit for the final exam and will result in a failing grade being assigned in this course.
   c. Excused absences include documented illness, deaths in the family, and other documented crises, call to active military duty or jury duty, religious holy days, and official University activities. These absences will be accommodated in a way that does not arbitrarily penalize students who have valid excuses. Consideration will also be given to students whose dependent children experience serious illnesses.
   d. Students with a legitimate reason to miss a required activity must request an approved absence through Student Academics. Unexcused absence from a scheduled examination or quiz may result in (0 %) being assigned for that assessment. Unexcused absence from an activity for which attendance is may be considered an issue of Professionalism.

e. Any student who arrives late will not be allowed to attend the class and will be marked absent.

B. Exam Attendance:

a. A student who is more than 10 minutes late, will not be permitted to submit the exam.

b. A student who is late more than 30 minutes will not be permitted to submit the final exam, and no student will be permitted to leave the exam center before the elapse of 30 minutes.

2. Exams Policies:

a. Students are expected to take their exams on time and as scheduled by their instructors.

b. Student who are unable to take (quiz, midterm or final) exam due to any reason should contact their instructor immediately.

c. Make-up exams are of the responsibility of faculty committee.

d. A final exam, paper, or project is required in all courses.

e. Seminars and workshops are included in evaluation criteria.

f. Only registered undergraduate and graduate credit students are allowed to take final exams.

g. If you are unable to take the final exam at the scheduled time without any acceptable excuse, you may not be allowed to rearrange the final exam separately (Make-up).

h. If you attend the final exam and do not submit the exam sheet, or do not complete the exam for any reason, you are not allowed to complete the final exam at another time or appeal for a final make-up exam and will be assigned falling for the final exam.

i. If you do not take your final exam and did not withdraw from the course by the withdrawal deadline you will assign a failing grade for the final exam.

3. Cheating Policies: Cheating is officially defined as giving or attempting to give, obtaining or attempting to obtain, information relative to an examination or other work that the student is expected to do alone and not in collaboration with others, or the use of material or information restricted by the instructor. Plagiarism is no lesser an offense than cheating, it means repeating another's sentences as your own, adopting a particularly apt phrase as your own, paraphrasing someone else's argument as your own, and presenting someone else's line of thinking in the development of a thesis as though it were your own.

4. **Penalty for cheating and plagiarism:** The failing grade, shall be assigned for that piece of work to any students cheating or plagiarizing.

5. **Mobiles:** Mobile phones should be kept turned off or silent while in class. Usage of mobile phones is not allowed in classes in any form (talking and/or texting).

8. Course Grading System:

Assessment Tools	Weight (100%)	Description
Exams (Midterm and Final)	90%	- MCQs and fill in the space questions - True/ False - Short essay - Matching - Identifying structures in drawing.
Quizzes and other assessments	10%	- MCQs and fill in the space questions - True/ False

9. Course Outlines/ Schedule:

Week	Topic	Chapter	Reference	Estimated number of hours	Theoretical Lectures	Practical Laboratories	ILOs
1	Units	1	Main text book	1	√		**Able to convert between units**
2,3	Kinematics in One Dimension, Vectors	2,3	Main text book	4	√		Understand simple vector analysis and apply it to one dimensional motion
4,5	Dynamics: Newton's laws of motion	4	Main text book	4	√		Understand Newton's laws and solve related problems

6,7	Work and Energy, Power	6	Main text book	4	√		Understand the relation between work and energy, and determine the power output.
8,9	Fluids	10	Main text book	6	√		Understand basic principles of fluid dynamics and relate it to the flow of blood in the arteries and veins.
10,11	Light: geometric optics	23	Main text book	4			Understand basic principles of light: Index of Refraction, Refraction: Snell's Law, Total Internal Reflection; Fiber Optics, Thin Lenses; Ray Tracing, The Thin Lens Equation.
12	Nuclear Physics and Radioactivity	30	Main text book	3	√		Define ionizing nuclear radiation and their benefit and harmfulness in human life.
13,14	Nuclear energy, effect of use radiation	31	Main text book	4	√		Understand the meaning of ionizing, know radiation units and asses radiation damage