هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

Course Specifications

Course Title:	**Medical and Biophysics**
Course Code:	**2034210-2**
Program:	**Bachelor in Physics**
Department:	**Physics Department**
College:	**College of Science**
Institution:	**Taif University**

Table of Contents

A. Course Identification

1. Credit hours: 2
2. Course type **a.** University ☐ College ☑ Department ☐ Others ☐ **b.** Required ☐ Elective ☑
3. Level/year at which this course is offered: 11th level / 4th year
4. Pre-requisites for this course (if any)**: None**
5. Co-requisites for this course (if any)**: None**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	3	100%
2	**Blended**		
3	**E-learning**		
4	**Distance learning**		
5	**Other**		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	30
2	**Laboratory/Studio**	
3	**Tutorial**	
4	**Others** (specify)	
	Total	30

B. Course Objectives and Learning Outcomes

1. Course Description

Basic concepts of the physical aspects and laws for some bioactivities of the vital organs in the human body. Studying the electric and magnetic phenomena inside the human body. Studying the physics of eye, vision, and sound of human body.

2. Course Main Objective

- Studying, understanding and interpretation of the physical aspects and laws for some bioactivities of the vital organs in the human body. For example the forces acting on the human body internally or externally (e.g. the forces of the muscles and the musculoskeletal system and the forces of the collision and friction applications and the force of gravity on the human body and in the medical field).
- Studying the electric phenomena inside the human body such as ECG, ERG, EEG and EMG.
- Studying the physics of eye and vision and use of physics in the repair of visual defects are considered.
- The medical applications of sound waves, ultrasound, and related phenomena such as sonar and different kinds of physical laws that govern medical imaging and ultrasound

diagnostics.

- The course aims in general to teach the students the importance of physical laws through the direct application of these laws in the bio-medical field.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	**Knowledge and Understanding**	
1.1	Recognize the physical aspects and laws for some bioactivities of the vital organs in the human body.	K4
1.2	Describe the physical aspects and laws for fluid mechanics in human body.	K4
2	**Skills :**	
2.1	Explain physical phenomena and concepts relevant to the course and their applications.	S4
2.2	Justify how Medical and Biophysics is essential for technology advances.	S1
3	**Values:**	
3.1	Show responsibility for working independently and for continuous improvement of personal capacities.	V1

C. Course Content

No	List of Topics	Contact Hours
1	**Unit 1: Biomechanics and Human Body Movement** ➢ **Static Forces**: - *Equilibrium and Stability of the Human Body* - *Skeletal Muscles* ➢ **Friction forces in and on the human body** ➢ **Motion:** - *Walking, running, Vertical Jump and Broad Jump*	4
2	**Unit 2: Energy, work and Power of the body** ➢ Conservation of the energy in the body ➢ Energy change in the body ➢ Work and power done by the body ➢ The body efficiency ➢ Anaerobic and aerobic process	4
3	**Unit 3: Physics of Cardiovascular System** ➢ Component of Cardiovascular System ➢ Systemic and pulmonary circulation system ➢ Cardiac cycle ➢ Work done by the heart ➢ Tension in the vessel wall	4

	➢ Factor affecting blood flow ➢ Types of blood flow	
4	**Unit 4: Electricity within the human body** ➢ Electric potentials along cells and nerve fibres ➢ Transmission of electric signals through a nerve axon ➢ Some medical applications of electric phenomena within the body	4
5	**Unit 5: Sound and ultrasound waves in medicine:** ➢ Physical properties of sound waves and their physical laws ➢ Absorption of sound within different organs in the body ➢ The medical stethoscope ➢ Use of ultrasound in imagining and diagnosis of different organs ➢ The SONAR phenomena	4
6	**Unit 6: Physics of eyes and vision** ➢ Accommodation of the eye ➢ Focusing elements in the eye ➢ Structure of the human eye ➢ Defective vision and Correction ➢ Type of ametropia	4
7	**Unit 7: Heat and human body** - Temperature scale - Specific Heat - Heat transfer and heat loss - Thermography - Applications of heat and cool in biology -	4
8	**Unit 8: Medical and biological applications of radiations**	2
Total		30

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge and Understanding**		
1.1	Recognize the physical aspects and laws for some bioactivities of the vital organs in the human body.	Lecture Group discussion	Homework report Quizzes Written exam
1.2	Identify the physical aspects and laws for fluid mechanics in human body.	Lecture Group discussion	Homework report Quizzes Written exam

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
2.0	**Skills**		
2.1	Explain physical phenomena and concepts relevant to the course and their applications.	- Problem based strategy. - Brain storming sessions.	- Written exam including problem solving - Activities such as assignments and problem solving missions
2.2	Analyse qualitatively and quantitatively experimental data of DC and AC electric circuits.	- Problem based strategy. - Brain storming sessions	- Written exam including problem solving Activities such as assignments and problem solving missions
3.0	**Values**		
3.1	Show responsibility for working independently and for continuous improvement of personal capacities.	Group discussion	Quizzes

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Activities	Periodically	10%
2	Midterm exam	6th	30%
3	Short exam	9th	10%
4	Final exam	12th	50%

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

- Each faculty member is assigned a group of students for continuous academic advice during six office hours weekly (6 hrs./week).
- Also teaching staff are available for individual student consultations during office hours

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Physics in Biology and Medicine, John R. Cameron 2003
Essential References Materials	Biophysics An Introduction: Roland Glaser, 2012
Electronic Materials	https://www.biophysics.org/

Other Learning Materials	CD associated with the text books (when available). Lecture notes and PowerPoints presentations prepared by the lecturer. Blackboard.

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	• Classrooms • Electricity and magnetism physics laboratory
Technology Resources (AV, data show, Smart Board, software, etc.)	• Data show • Laptop • Smart board
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Student Feedback on Effectiveness of Teaching	Students	Indirect
Evaluation of Teaching	Pear reviewer Program coordinator Departmental council Faculty council	Indirect
Improvement of Teaching	Program coordinator Relevant committee	Direct
Quality of learning resources	Students Instructor Faculty	Indirect
Extent of achievement of course learning outcomes,	Program coordinator Instructor	Direct
Course effectiveness and planning for improvement	Program coordinator Instructor	Indirect

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)
Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods (Direct, Indirect)

H. Specification Approval Data

Council / Committee	Department Council / Committee of academic development
Reference No.	
Date	October 2, 2022