



# Course Specification

— (Bachelor)

Course Title: <b>Medical and Biophysics</b>
Course Code: <b>2034210-2</b>
Program: <b>Bachelor in Physics</b>
Department: <b>Physics</b>
College: <b>Science</b>
Institution: <b>Taif University</b>
Version: <b>2<sup>nd</sup></b>
Last Revision Date: <b>10/10/2023</b>



## Table of Contents

<b>A. General information about the course:</b> .....	3
<b>B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods</b> .....	4
<b>C. Course Content</b> .....	5
<b>D. Students Assessment Activities</b> .....	6
<b>E. Learning Resources and Facilities</b> .....	7
<b>F. Assessment of Course Quality</b> .....	7
<b>G. Specification Approval</b> .....	8





## A. General information about the course:

### 1. Course Identification

1. Credit hours: (2)

2. Course type

A.  University  College  Department  Track  Others

B.  Required  Elective

3. Level/year at which this course is offered: ( 8<sup>th</sup> / 4<sup>th</sup> Year)

4. Course general 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.

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

None

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

None

7. Course Main Objective(s):

- 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.

### 2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	30	100%
2	E-learning	--	--
3	Hybrid	--	--





No	Mode of Instruction	Contact Hours	Percentage
	<ul style="list-style-type: none"> <li>Traditional classroom</li> <li>E-learning</li> </ul>		
4	Distance learning	--	--

### 3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	30
2.	Laboratory/Studio	-
3.	Field	-
4.	Tutorial	-
5.	Others (specify)	-
<b>Total</b>		<b>45</b>

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

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
<b>1.0</b>	<b>Knowledge and understanding</b>			
1.1	Recognize the physical aspects and laws for some bioactivities of the vital organs in the human body.	K4	Lecture Group discussion	Homework report Quizzes Written exam
1.2	Describe the physical aspects and laws for fluid mechanics in human body.	K4	Lecture Group discussion	Homework report Quizzes Written exam
<b>2.0</b>	<b>Skills</b>			
2.1	Explain physical phenomena and concepts relevant to the course and their applications.	S4	<ul style="list-style-type: none"> <li>Problem based strategy.</li> </ul> Brain storming sessions.	<ul style="list-style-type: none"> <li>Written exam including problem solving</li> </ul> Activities such as assignments and problem solving missions
2.2	Justify how Medical and Biophysics is essential for technology advances.	S1	<ul style="list-style-type: none"> <li>Problem based strategy.</li> </ul> Brain storming sessions	<ul style="list-style-type: none"> <li>Written exam including problem solving</li> </ul> Activities such





Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
				as assignments and problem solving missions
3.0	<b>Values, autonomy, and responsibility</b>			
3.1	Show responsibility for working independently and for continuous improvement of personal capacities.	V1	Group discussion	Quizzes

### C. Course Content

No	List of Topics	Contact Hours
1	<p><b><u>Unit 1: Biomechanics and Human Body Movement</u></b></p> <ul style="list-style-type: none"> <li><b>Static Forces:</b> <ul style="list-style-type: none"> <li><i>Equilibrium and Stability of the Human Body</i></li> <li><i>Skeletal Muscles</i></li> </ul> </li> <li><b>Friction forces in and on the human body</b></li> <li><b>Motion:</b> <ul style="list-style-type: none"> <li><i>Walking, running, Vertical Jump and Broad Jump</i></li> </ul> </li> </ul>	4
2	<p><b><u>Unit 2: Energy, work and Power of the body</u></b></p> <ul style="list-style-type: none"> <li>Conservation of the energy in the body</li> <li>Energy change in the body</li> <li>Work and power done by the body</li> <li>The body efficiency</li> <li>Anaerobic and aerobic process</li> </ul>	4
3	<p><b><u>Unit 3: Physics of Cardiovascular System</u></b></p> <ul style="list-style-type: none"> <li>Component of Cardiovascular System</li> <li>Systemic and pulmonary circulation system</li> <li>Cardiac cycle</li> <li>Work done by the heart</li> <li>Tension in the vessel wall</li> <li>Factor affecting blood flow</li> <li>Types of blood flow</li> </ul>	4
4	<b><u>Electricity within the human body :4 Unit</u></b>	4





	<ul style="list-style-type: none"> <li>• Electric potentials along cells and nerve fibres</li> <li>• Transmission of electric signals through a nerve axon</li> <li>• Some medical applications of electric phenomena within the body</li> </ul>	
5	<p><b><u>Unit 5: Sound and ultrasound waves in medicine:</u></b></p> <ul style="list-style-type: none"> <li>• Physical properties of sound waves and their physical laws</li> <li>• Absorption of sound within different organs in the body</li> <li>• The medical stethoscope</li> <li>• Use of ultrasound in imagining and diagnosis of different organs</li> <li>• The SONAR phenomena</li> </ul>	4
6	<p><b><u>Physics of eyes and vision :6 Unit</u></b></p> <ul style="list-style-type: none"> <li>• Accommodation of the eye</li> <li>• Focusing elements in the eye</li> <li>• Structure of the human eye</li> <li>• Defective vision and Correction</li> <li>• Type of ametropia</li> </ul>	4
7	<p><b><u>Unit 7: Heat and human body</u></b></p> <ul style="list-style-type: none"> <li>• Temperature scale</li> <li>• Specific Heat</li> <li>• Heat transfer and heat loss</li> <li>• Thermography</li> <li>• Applications of heat and cool in biology</li> </ul>	4
8	<b><u>Unit 8: Medical and biological applications of radiations</u></b>	2
<b>Total</b>		<b>30</b>

#### D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Assignments	Throughout Semester	20
2.	1 <sup>st</sup> Periodic Exam	7	15
3.	2 <sup>nd</sup> Periodic Exam	12	15
4.	Final Exam	16	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

<b>Essential References</b>	Biophysics An Introduction: Roland Glaser, 2012
<b>Supportive References</b>	Physics in Biology and Medicine, John R. Cameron 2003
<b>Electronic Materials</b>	<a href="https://www.biophysics.org/">https://www.biophysics.org/</a>
<b>Other Learning Materials</b>	CD associated with the text books (when available). Lecture notes and PowerPoints presentations prepared by the lecturer. Blackboard.

### 2. Required Facilities and equipment

Items	Resources
<b>facilities</b>	A classroom with movable tables and chairs conducive to group discussion and teamwork.
<b>Technology equipment</b>	Data show, smart board
<b>Other equipment</b> (depending on the nature of the specialty)	None

## F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Student Feedback on Effectiveness of Teaching	Students	Indirect
Evaluation of Teaching	Peer 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

**Assessors** (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

**Assessment Methods** (Direct, Indirect)





### G. Specification Approval

**COUNCIL /COMMITTEE** PHYSICS DEPARTMENT COUNCIL

**REFERENCE NO.** NO. 4-45

**DATE** 27/09/2023 (12/03/1445)

