



# University of Management and Technology

## School of Science

### Department of Physics

**Course Code** PH-105

**Course Title:** BIOLOGICAL PHYSICS

**Program:** BS (BT/BC)

### **Course Outline (Spring 2021)**

<b>Course Coordinator</b>	Hira Yaseen	<b>Contact</b>	Hira.yaseen@umt.edu.pk
<b>Course Description</b>	Equilibrium consideration for the Human Body, Friction at the Hip Joint, Translational Motion, Energy consumed in Physical Activity, Angular Motion, Elasticity and Strength of Materials, Bone Fracture: energy consideration, Insect Flight, Power required for Hovering, Force and Pressure in a Fluid, Power Required to Remain Afloat, Archimedes' Principle, The motion of Fluids, Bernoulli's Equation, Circulation of Blood, Blood Pressure, Power produced by the Heart, Heat and Kinetic Theory, Transfer of Heat, The Respiratory System, Laws of Thermodynamics, Heat and Life, Thermodynamics of Living Systems, Waves and Sound, Clinical Uses of Sound..		
<b>Expected Outcomes</b>	Much of the biological research during the past hundred years has been directed toward understanding living systems in terms of basic physical laws. This effort has yielded some significant successes. The purpose of this course is to relate some of the concepts in physics to living systems. Students will be prepared to undertake advance courses in Life Science and their relation to the physical laws..		
<b>Text Book Ref. Book</b>	Physics in Biology and Medicine, Paul Davidovits, 3 <sup>rd</sup> edition, Elsevier (Academic Press) 2008. Physics for Scientists and Engineers, Serway and Jewett, 7 <sup>th</sup> Edition, 2011.		
<b>Assignment &amp; Projects</b>	Problems will be assigned at regular intervals as an assignment.	<b>Quizzes</b>	All quizzes will be announced well before time. No make-ups will be offered for missed quizzes.
<b>Mid - Term Examination</b>	A 60-minutes exam will cover all the material covered during the first 15 lectures	<b>Final Examination</b>	A 120-minutes exam will cover all the material covered during the semester.
<b>Attendance Policy</b>	Students missing more than 20% of the lectures will receive an "SA" grade in the course and will not be allowed to take final exam.		



# BIOLOGICAL PHYSICS

## Lecture Plan (Spring 2021)

Week	Lecture #	TOPICS	CH	SECTIONS
1	1	Equilibrium and Stability	1	1 – 5
	2	The Elbow, the Hip, the Back	1	5 – 10
2	1	Standing at an Incline	2	1 – 2
	2	Spine Fin of a Catfish	2	3
3	1	Effect of Gravity on the Vertical Jump	3	1 - 4
	2	Running Broad Jump (Long Jump)	3	5 – 8
4	1	Angular Motion: Forces on a Curved Path	4	1 – 3
	2	Speed of Walking and Running	4	4 – 6
5	1	Energy Expended in Running	4	7 – 9
	2	Longitudinal Stretch and Compression	5	1 – 3
6	1	Impulsive Forces	5	4 – 5
	2	Airbags: Inflating Collision Protection Devices	5	6 - 9
7	1	Hovering Flight	6	1 – 3
	2	Power Required for Hovering	6	4 – 5
8	1	Force and Pressure in a Fluid	7	1 – 3
	2	Archimedes' Principle	7	4 – 7
9	1	Insect Locomotion on Water	7	8 – 11
	2	Bernouli's Equation	8	1 – 3
10	1	Circulation of the Blood	8	4 – 7
	2	Power Produced by the Heart	8	8 – 11
11	1	Heat and Kinetic Theory	9	1 – 3
	2	Transfer of Heat	9	4 – 6
12	1	The Respiratory System	9	7 – 9
	2	Laws of Thermodynamics	10	1 – 3
13	1	Thermodynamics of Living Systems	10	4 – 5
	2	Energy Requirements of People	11	1 – 4
14	1	Radiative Heating by the Sun	11	5 – 10
	2	Properties of Sound	12	1 – 3
15	1	Hearing and the Ear	12	4 – 5
	2	Clinical Uses of Sound	12	6 – 8

## **OVERALL POLICY:**

- **Student has to pass both Course work and Lab work separately.**
- **Student failing in the Course work but passing in the Lab work, has to repeat both Course work and Lab work.**
- **Student failing in the Lab work but passing in the Course work, has to repeat Lab work alone.**