

<i>DEPARTMENT OF BIOTECHNOLOGY</i>				<i>CLASS: I B.Sc. Biotechnology</i>				
<b>Sem</b>	<b>Course Type</b>	<b>Course Code</b>	<b>Course Title</b>	<b>Credits</b>	<b>Contact Hours/week</b>	<b>CIA</b>	<b>Ext</b>	<b>Total</b>
II	Core-3	20U2LMC3	General Physiology	3	3	25	75	100

**Course Objectives:**

1. To learn the basics of physiological processes in both plant and animals
2. To understand adaptive mechanisms against various stress conditions
3. Apply the physiological processes in the field of Biotechnology
4. Describe significance of physiological processes
5. Motivate the students to explore interaction between internal systems

**Unit-I: Organization of Animal and plant tissue**

Animal tissues – Types, Structure and functions of Epithelial, Connective, Muscle and Nervous tissues, Plant tissues – Types, Structure and functions of Ground (Parenchyma, Collenchyma & Sclerenchyma), Vascular (Xylem & Phloem) & Dermal (Epidermis & Periderm)

**Unit-II: Transportation in Plant and Animal Digestion**

Water Potential, Diffusion, Osmosis. Water absorption – apoplast and symplast. Active and passive, transport in xylem and Phloem. Structure & functions of digestive glands, Digestion and absorption of carbohydrates, proteins and lipids and its regulation

**Unit-III: Respiration & Circulation**

Respiratory organs - Tracheal system, gills and lungs, Transport of gases, respiratory pigments, Hemoglobin as oxygen carrier, respiratory quotient; Mechanism of gas exchange in tissues. Circulation - Open and closed system, components and functions of blood, mechanism of circulation, blood clotting mechanism

**Unit-IV: Transpiration and Excretion**

Transpiration - stomata opening and closing- Mechanism and hormonal regulation. Excretion - Excretory organs in animals, excretory products; structure and functions of human kidney, mechanism of urine formation. Dysfunction of kidney - renal failure, diagnosis and treatment.

**Unit-V: Neural System & Endocrine System**

Nervous system - CNS and ANS; neurons; propagation of nerve impulses - synaptic transmission. Reflex action and reflex arc, structure and physiology of hearing and vision. Endocrine system - structure and function of endocrine glands (pituitary, thyroid parathyroid, adrenal glands, Islets of Langerhans, thymus), Mode of action of hormones.

**Books for Study**

1. Mohan Arora. 2008. Animal Physiology. Himalya Publications
2. Russell JP. 2008. Plant and Animal Physiology. Brooks & Cole Publications

## Books for References

1. Moyes. 2011. Principles of Animal Physiology. Pearson publications
2. Brooker RJ. 2011. Biology. The McGraw-Hill Companies, Inc
3. Hoar. WS. 2004. General and Comparative Physiology. 3<sup>rd</sup> Edition. Prentics-Hall of India.
4. Bidlack JE & Jansky SH. 2011. Stern's Introductory Plant Biology. The McGraw-Hill Companies, Inc.

## Web Resources

1. <https://www.edx.org/xseries/harvardx-fundamentals-of-neuroscience>
2. <http://www.mblab.gla.ac.uk/~julian/DowLab.html>

## Pedagogy

The teaching methods may include Chalk and talk, PowerPoint, demonstrations through video, assignments and group discussions

## Course Learning Outcomes:

On completion of this course the students will be able to

#	CLOs	K - Level
CLO-1	Illustrate the structural organization of various systems within an animal body	Up to K-2
CLO-2	Explain the functions of various organ systems	Up to K-4
CLO-3	Classify the role of hormones in physiological processes	Up to K-4
CLO-4	Correlate interaction between various organ system	Up to K-4
CLO-5	Categorize the signal transduction mechanism	Up to K-4

## Mapping of Course outcomes with Program specific Outcomes:

	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6	PSO-7
CLO-1	1	2	1	3	1	--	--
CLO-2	1	3	2	2	1	2	--
CLO-3	2	3	1	2	2	3	--
CLO-4	3	3	1	2	1	--	--
CLO-5	2	2	3	2	1	3	2

Advance application-3; Intermediate level-2; Basic level-1

## Mapping of Course learning outcomes with Program Outcomes:

CO/PO	PO-1	PO-2	PO-3	PO-4	PO-5
CLO-1	3	--	2	--	--
CLO-2	3	2	2	--	--
CLO-3	3	2	2	3	--
CLO-4	3	2	2	3	--
CLO-5	3	--	3	1	--

Advance application-3; Intermediate level-2; Basic level-1

## LESSION PLAN

Unit-I	Description	Staff Name	Hours	Mode
I	Animal tissues – Types, Structure and functions of Epithelial, Connective, Muscle and Nervous tissues,		4	PPT & Discussion
	Plant tissues – Types, Structure and functions of Ground (Parenchma, Collenchyma & Sclerenchyma), Vascular (Xylem & Phloem) & Dermal (Epidermis & Periderm)		5	PPT & Discussion
II	Water Potential, Diffusion, Osmosis. Water absorption – apoplast and symplast.		2	Chalk & Talk & Demonstration
	Active and passive, transport in xylem and Phloem.		2	Chalk & Talk
	Structure & functions of digestive glands		2	Chalk & Talk & PPT
	Digestion and absorption of carbohydrates, proteins and lipids and its regulation		3	Chalk & Talk & Discussion
III	Respiratory organs - Tracheal system, gills and lungs, Transport of gases, respiratory pigments.		2	PPT & Discussion
	Hemoglobin as oxygen carrier, respiratory quotient.		3	PPT & Discussion
	Mechanism of gas exchange in tissues. Circulation - Open and closed system.		2	Chalk & Talk
	Components and functions of blood, mechanism of circulation, blood clotting mechanism.		2	PPT & Discussion
IV	Transpiration - stomata opening and closing- Mechanism and hormonal regulation.		3	Chalk & Talk
	Excretion - Excretory organs in animals, excretory products; structure and functions of human kidney.		3	Chalk & Talk
	Mechanism of urine formation. Dysfunction of kidney - renal failure, diagnosis and treatment.		3	PPT & Discussion
V	Nervous system - CNS and ANS; neurons; propagation of nerve impulses - synaptic transmission.		2	Chalk & Talk
	Reflex action and reflex arc, structure and physiology of hearing and vision.		3	PPT & animation
	Endocrine system - structure and function of endocrine glands (pituitary, thyroid parathyroid, adrenal glands, Islets of Langerhans, thymus), Mode of action of hormones.		4	Chalk & Talk
			45h	

**Learning Outcome Based Education & Assessment (LOBE)**  
**Blue Print – General Physiology Course**  
**Articulation Mapping – K Levels with Courses Learning Outcomes (CLOs)**

S. No.	CLOs	K-Level	Section A		Section B		Section C (Either / or Choice)	Section D (Open Choice)
			MCQs		Short Answers			
			No. of Questions	K-Level	No. of Questions	K- Level		
1.	CLO 1	Up to K 3	2	K1 & K2	1	K1	2 (K1&K1)	1(K2)
2.	CLO 2	Up to K 4	2	K1 & K2	1	K1	2 (K2&K2)	1(K3)
3.	CLO 3	Up to K 4	2	K1 & K2	1	K2	2 (K3&K3)	1(K3)
4.	CLO 4	Up to K 2	2	K1 & K2	1	K2	2 (K4&K4)	1(K3)
5.	CLO 5	Up to K 4	2	K1 & K2	1	K2	2 (K3&K3)	1(K4)
No. of Questions to be asked			10		5		10	5
No. of Questions to be answered			10		5		5	3
Marks for each Question			1		2		5	10
Total Marks for each Section			10		10		25	30

**Distribution of Section-wise Marks with K Levels**

K Levels	Section A (No Choice)	Section B (No Choice)	Section C (Either/or)	Section D (Open Choice)	Total Marks	% of Marks without choice	Consolidated
K1	5	4	10	-	<b>19</b>	15.83	<b>42%</b>
K2	5	6	10	10	<b>31</b>	25.83	
K3	-	-	20	30	<b>50</b>	41.67	<b>42%</b>
K4	-	-	10	10	<b>20</b>	16.67	<b>16%</b>
Total Marks	10	10	50	50	<b>120</b>	100.00	<b>100%</b>

### Distribution of Unit-wise questions with K Levels

Section A	Section B	Section C	Section D
2 Questions for each Unit (K1 & K2 Level)	1 Question from each Unit (K1 & K2 Level)	2 Questions from Unit-I (K1 Level)	1 Question from Unit-I (K2 Level)
		2 Questions from Unit-II (K2 Level)	1 Question from Unit-II (K3 Level)
		2 Questions from Unit-III (K3 Level)	1 Question from Unit-IV (K3 Level)
		2 Questions from Unit-IV (K4 Level)	1 Question from Unit-III (K3 Level)
		2 Questions from Unit-V (K3 Level)	1 Question from Unit-V (K4 Level)

K1 –Remembering and recalling facts with specific answers

K2 – Basic understanding of facts and stating main ideas with general answers

K3 – Application oriented – Solving Problems

K4 – Examining, analyzing, presentation and make interferences with evidences

**Course content designed by Dr. P. Vimal**