DEPARTMENT OF ZOOLOGY				*CLASS: I B.Sc. Chemistry*				
Semester	**Course Type**	**Course Code**	**Course Title**	**Credits**	**Contact Hours/week**	**CIA**	**Ext**	**Total**
I	Allied	20U1ZAC1	Fundamentals of Invertebrates & Chordates	4	4	25	75	100

Course Objectives:

1. To understand the general characters and outline classification of Invertebrate and Chordate.
2. To identify the animals and recognize their distinguishing features.
3. To appraise the specific features of animal and their life cycle.
4. To understand the morphology and adaptations of animals in the context of evolution.
5. To learn how different body designs solve biological problems related to physiological and environmental challenges.

Unit-I: Classification, Protista & Porifera

Systems of classification and nomenclature, Levels of organization, Types of symmetry. General characters and outline classification of invertebrates (up to phylum) with examples. Life cycle of *Plasmodium*, Canal system in sponges, Corals and coral reefs.

Unit-II: Platyhelminthes, Annelida& Arthropoda

Parasitic adaptation in helminthic worms, Metamerism in Annelida, Metamorphosis in insects, Mouth parts in insects, Affinities of Peripatus.

Unit-III: Mollusca, Echinodermata & Chordata

Torsion in Mollusca, Economic importance of Mollusca, Water vascular system in starfish.
General characters and outline classification of Chordates (up to class) with examples.

Unit-IV: Prochordates & Fishes

General characters and classification of Urochordates, Cephalochordates and Hemichordates (up to class) with examples, Parental care in fishes, Migration of fishes.

Unit-V: Amphibia, Reptilia, Birds & Mammals

Neoteny in Amphibians, Poisonous snakes of south India (Cobra and krait), Identification of poisonous and non poisonous snakes, Flight adaptations in birds, Egg laying and pouched mammals, Adaptive radiation in mammals.

Books for Study

1. Nair N.C, Leelavathy S, Soundara Pandian N, Murugan T and Arumugam N, 2017. *A Text Book ofInvertebrates,* Saras Publication, Nagercoil.
2. Thangamani A, Prasannakumar S, Narayanan L.M and Arumugam N, 2017. *A Text Book ofChordates,* SarasPublication, Nagercoil.
3. Nair N.C, Thangamani A, Leelavathy S, Prasanakumar S, Soundrapandian N, Murugan T, Narayanan L.M and Arumugam N, 2017. *Animal diversity (Invertebrata& Chordata)*, Saras Publication, Nagarcoil.
4. Arumugam N, 2019. *Animal Diversity – Chordata*, *Volume - 2*, Saras Publication, Nagercoil.

5. Kotpal R.L, 2017. *Modern Text Book of Zoology*:*Invertebrate*, Rastogi Publications, Meerut.
6. Kotpal R.L, 2017. *Modern text book of Zoology*:*Vertebrates*, Rastogi Publications, Meerut.

Books for References

1. Barnes R.D. 2006. *Invertebrate Zoology* (1982) VIIth Edition, Holt Saunders International Edition.
2. EkambaranathaAyyar and AnanthakrishnanT.N , *Manual of Zoology Vol–I, Part I &II,* S.ViswanathanPvt. Ltd. Chennai.
3. Kotpal R.L, Agarwal S.K and Khetarpal R.P, 1990. *Invertebrates,* Rastogi Publications, Meerut.
4. Anderson D.T, 2001. *Invertebrate Zoology*, Oxford University Press, New Delhi.
5. Verma P.S, 2010. *Chordate Zoology*, S Chand Publishers, New Delhi.

Web Resources

1. https://www.nwf.org/Educational-Resources/Wildlife-Guide/Invertebrates
2. https://biologydictionary.net/invertebrate/
3. https://basicbiology.net/animal/invertebrates
4. https://www.khanacademy.org/science/biology/crash-course-bio-ecology/crash-course-biology-science/v/crash-course-biology-121
5. https://www.khanacademy.org/science/biology/crash-course-bio-ecology/crash-course-biology-science/v/crash-course-biology-122
6. https://www.khanacademy.org/science/biology/crash-course-bio-ecology/crash-course-biology-science/v/crash-course-biology-123
7. https://ucmp.berkeley.edu/vertebrates/vertintro.html
8. https://ucmp.berkeley.edu/chordata/chordata.html

Pedagogy

Chalk and Talk, PPT, group discussion, seminar, interaction, quiz, tutorial and virtual labs.

Course Learning Outcomes:

	CLO Statement	Knowledge level
CLO-1	Understand the diversity and basic taxonomy of Invertebrates and Chordates.	K1
CLO-2	List the general characters and outline classification of Invertebrates and Chordates.	K2
CLO-3	Apply the knowledge to identify the Invertebrate and Chordate fauna based on their unique characters.	K3
CLO-4	Analyse the importance and specific adaptation of Invertebrate and Chordates in their habitat.	K4
CLO-5	Examine the role of Invertebrate and Chordates in biological communities and ecological interactions.	K4

Mapping with Programme Specific Outcomes of Chemistry:

	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6	PSO-7	PSO-8
CLO-1	2		1	1				
CLO-2	2		1	1				
CLO-3	2							
CLO-4	2		1					
CLO-5	2	2	2	1	2	2		

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

Mapping with Programme Outcomes:

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

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

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Articulation Mapping - K Levels with *Course Learning Outcomes (CLOs)*

Sl. 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 2	2	K1& K2	1	K1	2 (K1&K1)	1(K2)
2	CLO 2	Up to K 3	2	K1& K2	1	K2	2 (K2&K2)	1(K3)
3	CLO 3	Up to K 3	2	K1& K2	1	K2	2 (K3&K3)	1(K3)
4	CLO 4	Up to K 4	2	K1& K2	1	K2	2 (K4&K4)	1(K4)
5	CLO 5	Up to K 3	2	K1& K2	1	K2	2 (K3&K3)	1(K3)
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

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 inferences with evidences

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	2	10	--	**17**	14.16	**42%**
K2	5	8	10	10	**33**	27.5	
K3	-	-	20	30	**50**	41.67	**42%**
K4	-	-	10	10	**20**	16.67	**16%**
Total Marks	10	10	50	50	**120**	100.00	**100%**

LESSON PLAN (Total hours: 60)

Unit	Description	Staff Name	Hours	Mode
I	Systems of classification & nomenclature		1	Group Discussion
	Levels of organization		1	Interaction
	Types of symmetry		1	Group Discussion
	General characters of Invertebrates		1	Interaction
	Classification of Invertebrates (up to phylum) with examples		2	Group Discussion
	Life cycle of *Plasmodium*		2	Chalk and Talk
	Canal system in sponges		2	PPT
	Corals and coral reefs		2	Lecture
II	Parasitic adaptation in helminthic worms		3	Group Discussion
	Metamerism in Annelida		2	Interaction
	Metamorphosis in insects		2	Chalk and Talk
	Mouth parts in insects		3	PPT
	Affinities of Peripatus		2	Lecture
III	Torsion in Mollusca		3	Group Discussion
	Economic importance of Mollusca		3	Interaction
	Water vascular system in starfish		2	Chalk and Talk
	General characters of Chordates		2	PPT
	Classification of Chordates (up to class) with examples		2	Lecture
IV	General characters and classification of Urochordates (up to class) with examples		2	Group Discussion
	General characters of and classification Cephalochordates (up to class) with examples		3	Interaction
	General characters and classification of Hemichordates (up to class) with examples		2	Group Discussion
	Parental care in fishes		3	PPT
	Migration of fishes		2	Lecture
V	Neoteny in Amphibians		2	Group Discussion
	Poisonous snakes of south India (Cobra and krait)		2	Interaction
	Identification of poisonous and non poisonous snakes		2	Chalk and Talk
	Flight adaptations in birds		2	PPT
	Egg laying and pouched mammals		2	Interaction
	Adaptive radiation in mammals		2	Lecture

Course designers: Dr. C. Selvakumar and Mrs. P. Sumathi