

SEMESTER II



University of Kerala

Discipline	ZOOLOGY				
Course Code	UK2DSCZOO101				
Course Title	Non - Chordate Diversity-Part II				
Type of Course	DSC				
Semester	II				
Academic Level	100 - 199				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours/Week
	4	3 hours	0	2 hours	5
Pre-requisites	Pass in class XII				
Course Summary	This course provides the students with an in-depth knowledge of the diversity in form, structure and habits of coelomata. This course also provides students with a comprehensive understanding of the diverse world of invertebrates and the evolutionary significance of coelomates in the animal kingdom. Through lectures, discussions, and hands-on activities, students will gain insight into the remarkable adaptations and ecological roles of these fascinating organisms.				

Detailed Syllabus

Module	Unit	Content	45 hrs
I	Annelida		6
	1.1	Annelida- General characteristics and classification (up to classes)	2
	1.2	Polychaeta: eg. <i>Nereis</i> (mention <i>heteronereis</i>), Oligochaeta: eg. Earthworm. Hirudinea: eg. Leech	2
	1.3	General topic: Vermicomposting	2

II	Arthropoda		14
	2.1	Arthropoda : General characters, Prawn (detailed study)	7
	2.2	Classification up to classes- Suphylum Trilobitomorpha- Class Merostomata eg. <i>Limulus</i> ; Class Arachnida eg. Scorpion; Class Pycnogonida eg. Nymphon; Subphylum Mandibulata- Class Crustacea eg. <i>Sacculina</i> ; Class Chilopoda eg. <i>Scolopendra</i> ; Class Symphyla e.g. <i>Scutigera</i> ; Class Diplopoda eg. <i>Spirostreptus</i> ; Class Pauropoda eg. Pauropus Class Insecta eg. Cockroach (external characters mouth parts, digestive system)	7
III	Onychophora and Mollusca		11
	3.1	General characters of Onychophora	1
	3.2	<i>Peripatus</i> (Evolutionary significance).	2
	3.3	Mollusca: General characteristics and classification (up to classes)	1
	3.4	Monoplacophora: eg. <i>Neopilina</i> , Polyplacophora: eg. <i>Chiton</i> , Aplacophora: eg. <i>Neomenia</i> , Gastropoda: eg. <i>Pila</i> , Scaphopoda: eg. <i>Dentalium</i> , Pelecypoda: eg. <i>Perna</i> , Cephalopoda: eg. <i>Sepia</i> .	6
	3.3	General topic: Economic importance of mollusca	1
IV	Echinodermata		7
	4.1	General characteristics and classification (up to classes).	1
	4.2	Asterozoa: eg. <i>Asterias</i> , Ophiurozoa: eg. <i>Ophiothrix</i> , Echinozoa: eg. <i>Echinus</i> , Holothurozoa: eg. <i>Sea cucumber</i> , Crinozoa: eg. Sea lily.	3
	4.3	General Topic: Water-vascular system and Larval forms in Echinodermata	3
V	Nonchordates in Humanwelfare		7
	5.1	Morphology and Social life in bees	2
	5.2	Pearl culture	2
	5.2	Important Research & Development Institutes in Southern India for Apiculture, Sericulture and Pearl Culture	3

References

1. Barnes, R.D. (1987): Invertebrate Zoology. W: B. Saunders. New Delhi.
2. Barnes, R.S.K., Calow, P., Olive, P. J. W., Golding, D.W. and Spicer, J.I. (2002). The Invertebrates: A New Synthesis, III Edition, Blackwell Science
3. Barrington E.J.W. (1967). Invertebrate Structure and Function. ELBS and Nelson, London.
4. Brusca, R.C . and G. J. Brusca. (1940). Invertebrates. Sinauer Associates, Sunderland, M.A.
5. Ekambaranatha Ayyar M. (1990). A Manual of Zoology. Vol. Invertebrata- Part1 & PartII. S. Viswanathan Printers and Publishers. Pvt. Ltd.
6. Hyman, L. H. (1942). The invertebrate volumes. Mc Gew Hill
7. Jordan, EL and Verma, P.S. (2000). Invertebrate Zoology. S. Chand and Co Ltd. New Delhi.
8. Ruppert and Barnes, R.D. (2006). Invertebrate Zoology, VIII Edition. Holt Saunders
9. International Edition
10. Woese CR, Kandler O, Wheelis ML (June 1990). "Towards a natural system of organisms: proposal for the domains Archaea, Bacteria, and Eucarya". Proceedings of the National Academy of Sciences of the United States of America. 87 (12): 4576–9

Web Resources

1. <https://eol.org>
2. <http://www.tolweb.org>
3. <https://www.marinebio.org/creatures/marine-invertebrates>
4. <https://www.montereybayaquarium.org/animals/animals>

Practicum (30 hrs)

Sl No.	Contents
1.	Study of following specimens: Annelida - Nereis, Hirudinaria, Earthworm Arthropoda - Limulus, Sacculina, Eupagurus, Bombyx, honey bees Onychophora – Peripatus Mollusca - Chiton, Dentalium, Pila, Pinctada, Sepia Echinodermata - Asterias, Echinus, Sea cucumber, Sea lily
2.	Mount the body setae of Earthworm/ Nereis parapodia/ Wing scales of butterfly/Radula of Sepia (any one).
3.	Mount the mouth parts of Cockroach / Honey bee/ mosquito (any one).
4.	Mount the appendages of prawn.
5.	Dissection of nervous system of prawn/ nervous system of Cockroach/digestive system of Cockroach (any one).

References

1. Barnes, R.S.K., Calow, P., Olive, P. J. W., Golding, D.W. and Spicer, J.I. (2002). The Invertebrates: A New Synthesis, III Edition, Blackwell Science
2. Barrington, E.J.W. (1979). Invertebrate Structure and Functions. II Edition, E.L.B.S. and Nelson.
3. Boradale, L.A. and Potts, E.A. (1961). Invertebrates: A Manual for the use of Students. Asia Publishing Home .
4. Brusca, R.C, Giribet G, and Moore W (2023). Invertebrates (fourth edition). Sinauer Associates, Sunderland, M.A. Oxford University Press, USA.
5. Dhama. P.S and Dhama, J. K. (1979). Invertebrate zoology. R. Chand & Co. New Delhi.
6. Ekambaranatha Ayyar M. (1990). A Manual of Zoology. Invertebrata- Part1 & PartII. S. Viswanathan Printers and Publishers. Pvt. Ltd.
7. Henry Sherring Pratt (2015). A Course in Invertebrate Zoology: A Guide to the Dissection and Comparative Study of Invertebrate Animals. Palala Press.
8. Jordan, EL and Verma, P.S. (2000). Invertebrate Zoology. S. Chand and Co Ltd. New Delhi.
9. Ruppert and Barnes, R.D. (2006). Invertebrate Zoology, VIII Edition. Holt Saunders International Edition.

Course Outcomes

No.	Upon completion of the course the graduate will be able to	Cognitive Level	PSO addressed
CO-1	Understand the classification and examples of annelids and arthropods, onychophorans ,molluscs and echinoderms with characteristic features and demonstrate the process and importance of vermicomposting,pearl culture in sustainable agriculture and industry.	U, R, Ap	PSO-1,3
CO-2	Compare the adaptations of annelids and arthropods, onychophorans ,molluscs and echinoderms	R, U, An	PSO-1, 3
CO-3	Learn anatomy by applying and acquiring skills in simple dissections and mountings on permitted species and demonstrating projects or new models for classification.	R,U, C	PSO-1, 4
CO-4	Obtain an overview of evolutionary significance of parasitic and economically important species and Apply knowledge in identifying, classifying and categorising non-chordate organism	U, R, Ap	PSO-6
CO-5	Assess the importance of non-chordates in human welfare	U, E	PSO-6

R-Remember, U-Understand, Ap-Apply, An-Analyse, E-Evaluate, C-Create

3. Boradale, L.A. and Potts, E.A. (1961). Invertebrates: A Manual for the use of Students. Asia Publishing Home .
4. Brusca, R.C, Giribet G, and Moore W (2023). Invertebrates (fourth edition). Sinauer Associates, Sunderland, M.A. Oxford University Press, USA.
5. Dhama. P.S and Dhama, J. K. (1979). Invertebrate zoology. R. Chand & Co. New Delhi.
6. Ekambaranatha Ayyar M. (1990). A Manual of Zoology. Invertebrata- Part I & Part II. S. Viswanathan Printers and Publishers. Pvt. Ltd.
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Course Outcomes

No.	Upon completion of the course the graduate will be able to	Cognitive Level	PSO addressed
CO-1	Understand the classification and examples of annelids and arthropods, onychophorans ,molluscs and echinoderms with characteristic features and demonstrate the process and importance of vermicomposting, pearl culture in sustainable agriculture and industry.	U, R, Ap	PSO-1,3
CO-2	Compare the adaptations of annelids and arthropods, onychophorans ,molluscs and echinoderms	R, U, An	PSO-1, 3
CO-3	Learn anatomy by applying and acquiring skills in simple dissections and mountings on permitted species and demonstrating projects or new models for classification.	R,U, C	PSO-1, 4
CO-4	Obtain an overview of evolutionary significance of parasitic and economically important species and Apply knowledge in identifying, classifying and categorising non-chordate organism	U, R, Ap	PSO-6
CO-5	Assess the importance of non-chordates in human welfare	U, E	PSO-6

R-Remember, U-Understand, Ap-Apply, An-Analyse, E-Evaluate, C-Create

Name of the Course: Non - Chordate diversity-Part II

Credits: 3:0:1 (Lecture: Tutorial: Practical)

CO No.	CO	PO/PSO	Cognitive Level	Knowledge Category	Lecture (L)/Tutorial (T)	Practical (P)
CO-1	Understand the classification and examples of annelids and arthropods, onychophorans, molluscs and echinoderms with characteristic features and demonstrate the process and importance of vermicomposting, pearl culture in sustainable agriculture and industry.	PO-2/PSO - 1,2,4	U, R, Ap	F	L	
CO-2	Compare the adaptations of annelids and arthropods, onychophorans, molluscs and echinoderms	PO-1,2/PSO -1, 3	R, U, An	F,C	L	
CO-3	Learn anatomy by applying and acquiring skills in simple dissections and mountings on permitted species and demonstrating projects or new	PO-3/PSO - 3, 5, 6	R, U, C	F,C,P	L	

	models for classification.					
CO-4	Obtain an overview of evolutionary significant, parasitic and economically important species and Apply identification skill, to observe and categorise organism	PO-6/PSO - 1,2,4.6	R, U, Ap	F,C,P		P
CO-5	Assess the importance of non-chordates in human welfare	PO-6/PSO - 1, 2	U, E	F,C,P		P

F-Factual, C- Conceptual, P-Procedural, M-Metacognitive

Mapping of COs with PSOs and POs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8	PO1	PO2	PO3	PO4	PO5	PO 6
CO 1	3	3	-	3	-	-	-	-	-	2	-	-	-	-
CO 2	3	-	3	-	-	-	-	-	3	3	-	-	-	-
CO 3	-	-	3	-	3	3	-	-	-	-	3	-	-	-
CO 4	3	3	-	3	-	3	-	-	-	-	-	-	-	3
CO 5	3	3	-	-	-	-	-	-	-	-	-	-	-	3

Correlation Levels:

Level	Correlation
-	Nil
1	Slightly / Low
2	Moderate / Medium
3	Substantial / High

Related Activity

A study tour to visit Important Research & Development Institutes in Southern India for Apiculture/ Sericulture/Pearl Culture

Assessment Rubrics:

Assignment/ / Seminar topics

1. Vector borne diseases – Dengue fever, Japanese Encephalitis, Malaria, Cutaneous leishmaniasis
2. Economic importance of Molluscs
3. Social life in honey bees
4. Larval forms of Penaeus
5. Water vascular system in Echinodermata

Continuous Comprehensive Assessment

1. Assignments
2. Seminars
3. Submission of activity report
4. Test
5. Quiz/Debate

End Semester Evaluation

1. Multiple Choice Questions
2. Very Short Answer Questions
3. Short Answer questions
4. Essay Type questions

Mapping of COs to Assessment Rubrics

	Internal Exam	Assignment	Project Evaluation	End Semester Examinations
CO 1	✓	✓		✓
CO 2	✓	✓		✓
CO 3	✓	✓		✓
CO 4				✓
CO5				✓