



## University of Kerala

Discipline	<b>ZOOLOGY</b>				
Course Code	<b>UK3DSCZOO205</b>				
Course Title	<b>Human Parasitology and Vector- Borne Diseases</b>				
Type of Course	<b>DSC</b>				
Semester	<b>III</b>				
Academic Level	200 – 299				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours/Week
	4	3 hours	-	2 hours	5
Pre-requisites	Pass in Class XII				
Course Summary	This undergraduate course provides students with a comprehensive understanding of human parasitology and vector-borne diseases. Through lectures, laboratory sessions, and fieldwork, students will explore the fundamental concepts, epidemiology, transmission, and control strategies related to various parasitic organisms and vector-borne diseases affecting human populations.				

### Detailed Syllabus

Module	Unit	Content	45 hrs
<b>I</b>		<b>Introduction to Parasitology and Vector Biology</b>	<b>10</b>
	1.1	Overview of human parasites and vectors – Introduction, definition of terms – parasites, host, carriers, parasitism, Importance of studying parasitic and vector borne diseases	2
	1.2	Types of parasites – Permanent & Temporary, Facultative & Obligate, Zoophilic & Anthrophilic, Ectoparasites and Endoparasites, Monogenetic & Digenetic - definition and 1 example each	2
	1.3	Classification of human parasites – Protozoa and Metazoa (Helminths and Arthropods) Helminths - Platyhelminthes (Trematoda and Cestoda) and Nematoda Arthropoda – Arachnida, Insecta	2

	1.4	Types of vectors – Biological (Active) and Mechanical (Passive)– definition and 2 examples each	1
	1.5	Classification of vectors – Arthropoda, Mollusca and Mammalia – One example each	1
	1.6	Host-parasite interactions – parasitism, commensalism and mutualism Host- vector interactions	2
<b>II</b>	<b>Basic Concepts in Parasite Biology</b>		<b>10</b>
	2.1	Morphological characteristics and Taxonomic classification of common human parasites – <i>Plasmodium vivax</i> , <i>Entamoeba histolytica</i> , <i>Schistosoma haematobium</i> , <i>Taenia solium</i> , <i>Ascaris lumbricoides</i> , <i>Ancylostoma duodenale</i> and <i>Wuchereria Bancrofti</i>	3
	2.2	Parasite life cycles – direct vs. indirect transmission, host specificity and host range, modes of transmission – waterborne (mention example <i>E. histolytica</i> ), foodborne (mention example <i>T. solium</i> ), vector-borne (mention example <i>P. vivax</i> ) and zoonotic transmission (mention example <i>Toxoplasma. gondii</i> )	2
	2.3	Epidemiology of Parasitic diseases – global distribution, factors influencing disease transmission – environmental, socioeconomic and behavioral factors; Impact of climate change and urbanization on disease epidemiology	3
	2.4	Host-Parasite Interactions – Overview of host immune responses to parasitic infections, mechanisms of evasion of host immunity	2
<b>III</b>	<b>Human Parasitic Diseases</b>		<b>12</b>
	3.1	Protozoan parasites: Morphology, life cycles, and pathogenesis – <i>Plasmodium vivax</i> , <i>Entamoeba histolytica</i> . Add notes on clinical manifestations/symptoms, treatment and prophylaxis.	4
	3.2	Helminthic parasites: Morphology (emphasis on parasitic adaptations), life cycles, and pathogenesis – <i>Schistosoma haematobium</i> , <i>Taenia solium</i> . Add notes on clinical manifestations/symptoms, treatment and prophylaxis.	4
	3.3	Human Nematode parasites: Morphology (emphasis on parasitic adaptations), life cycles, and pathogenesis – <i>Ascaris lumbricoides</i> , <i>Ancylostoma duodenale</i> and <i>Wuchereria bancrofti</i> . Add notes on clinical manifestations/symptoms, treatment and prophylaxis.	4
	<b>Introduction to Vector-borne diseases</b>		<b>8</b>
	4.1	Introduction to vector-borne diseases and overview of vectors- mosquitoes, ticks, flies	2

<b>IV</b>	4.2	Major vector-borne diseases: malaria, dengue fever, Zika, Lyme disease and rat fever -Pathogenesis and clinical manifestations, treatment, and prophylaxis	4
	4.3	Public health implications and vector control measures (insecticide-treated bed nets, indoor residual spraying)	2
<b>V</b>	<b>The Importance and Future of Parasitology</b>		<b>5</b>
	5.1	Importance of studying human parasitology and vector biology – impact on vulnerable populations	1
	5.2	Ethical and social considerations – ethical issues related to research on human parasitic diseases; social determinants – transmission and access to healthcare	1
	5.3	The future of parasitology – Vaccine development and implementation, targeted therapy, vector control and surveillance, career opportunities (research scientist, public health specialist, vector control specialist, medical entomologist, epidemiologist, academic educator, consultant, wildlife biologist, pharmaceutical/biotechnology industry professional	2
	5.4	Indian Institutes specializing in Parasitology and Vector-borne diseases – NIMR (New Delhi), NIE (Chennai), NIV (Pune), VCRC (Puducherry), RMRC (Dibrugarh), ICMR-NITM (Belagavi), IIPH (Gandhinagar), NCDC (Delhi) – mention their role/contribution	1

### References:

1. Advances in Parasitology Vol. 1-4 (2011). Annual Reviews Inc.
2. Azad, A.F (1986). Mites of public health importance and their control. World Health Organization. Division of Vector Biology and Control (1986).
3. Benelli G, Jeffries CL, Walker T (2016). Biological Control of Mosquito Vectors: Past, Present, and Future. Insects. Oct 3; 7(4):52. doi: 10.3390/insects7040052. PMID: 27706105; PMCID: PMC5198200.
4. Bonita R., Beaglehole, R. and Kjellstrom, T. (2006). Basic Epidemiology (Second edition). WHO, Geneva.
5. Burton J. Bogistch, Clint E. Carter, Thomas N. Oeltmann. (2005). Human Parasitology. Third Edition, Elsevier Academic press.
6. Chaterjee, K.D. (1981). Parasitology: Protozoology and Helminthology: Introduction to Clinical Medicine. Ed 12.Chaterjee Medical Publishers.
7. Davis A. Warrell and Herbert M. Gilles. (2002). Essential Malariology, Fourth Edition. Arnold pub. Oxford.

8. Dennis French, Tom Craig, Jerome Hogsette, Jr, Angela Pelzel-McCluskey, Linda Mittel, Kenton Morgan, David Pugh and Wendy Vaala (2016). External Parasite and Vector Control Guidelines, The American Association of Equine Practitioners.
9. Gordis, L. (2018). Epidemiology (Sixth edition.). Philadelphia: Elsevier Saunders
10. Gubler, D.J. E. E. Ooi, S. Vasudevan, J. Farra, Duane J. Gubler, EngEong Ooi, Subhash Vasudevan, Jeremy Farrar. (Aug. 2014). Dengue and Dengue Hemorrhagic Fever. Ed. 2. CABI
11. Guidelines for integrated vector management for control of Aedes mosquito, Govt of India National Vector Borne Disease Control Programme, Directorate General of Health Services, Ministry of Health & Family Welfare
12. Harwood R.F. and James M.T. (1979). Entomology in Human and animal health. Macmillan Publishing Co. Inc, London. 7 Ed.
13. Ian F. Burgess (2004). Human Lice and their Control, Annu. Rev. Entomol. 49:457–81 doi: 10.1146/annurev.ento.49.061802.123253
14. Kochchar, S.K. (2009). A Text Book of Parasitology. Wisdom Press.
15. Lena Lorenz and Mary Cameron (2013). Biological and Environmental control of Disease vectors. CABI Publishing
16. National ethical guidelines for biomedical and health research involving human participants. New Delhi: Indian Council of Medical Research; 2017.
17. Nutman. (2002). Lymphatic filariasis. Imperial College.
18. Paniker CK, Ghosh S. (2021). Paniker's Textbook of Medical Parasitology, 9/e, Jaypee Brothers Medical Publishers.
19. Park. K. (2023). Park's textbook of preventive and social medicine, 27/e, Bhanot publishers.
20. Rothman K, Greenland S, and Lash TL. Modern epidemiology, 4th Edition. Philadelphia, PA: Lippincott Williams & Wilkins.
21. Sabesan S, Raju KH, Subramanian S, Srivastava PK, Jambulingam P. Lymphatic filariasis transmission risk map of India, based on a geo-environmental risk model. Vector-Borne and Zoonotic Diseases. 2013; 13(9): 657-65.
22. Stephen L. Doggett (2005). Bed bug ecology and control, Pests of Disease and Unease, Australia
23. WHO (2015). Indoor Residual Spraying. An operational manual for indoor residual spraying (IRS) for malaria transmission control and elimination,
24. World Health Organization. (2012). Handbook for integrated vector management. World Health Organization. <https://apps.who.int/iris/handle/10665/44768>

### Practicum (30 hrs)

Sl. No.	Contents
1.	Study of <i>Plasmodium vivax</i> , <i>Entamoeba histolytica</i> , and their life stages through permanent slides/photomicrographs or specimens.
2.	Study of adult <i>Schistosoma haematobium</i> , <i>Taenia solium</i> and their parasitic adaptations (Slides/microphotographs)
3.	Study of adult <i>Ascaris lumbricoides</i> , <i>Wuchereria bancrofti</i> and their parasitic adaptations (Slides/micro-photographs)

4.	Study of arthropod vectors associated with human diseases through permanent slides/ photographs: <i>Pediculus</i> , <i>Culex</i> , <i>Anopheles</i> , <i>Aedes</i> , <i>Musca domestica</i>
5.	Mounting and dissection: Mouth parts of mosquito and housefly.
6.	Submission of a report based on survey of selected localities about any one of the insect vectors and disease transmitted

#### References:

1. Imms, A.D. (1977). A General TextBook of Entomology. Chapman & Hall, UK .
2. Ruppert and Barnes, R.D. (2006). Invertebrate Zoology, VIII Edition. Holt Saunders International Edition.
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. (1979). Invertebrate Structure and Functions. II Edition, E.L.B.S. and Nelson
4. Chapman, R.F. (1998). The Insects: Structure and Function. IV Edition, Cambridge University Press, UK

#### Course Outcomes

No.	Upon completion of the course the graduate will be able to	Cognitive Level	PSO addressed
CO-1	<b>Identify, Understand, classify ,Analyse and Apply the knowledge of common parasites and vectors:</b> Students will demonstrate the ability to recognize and classify various parasites and vectors based on their morphological characteristics and taxonomic classification.	R, U, An, Ap, E, Cr	PSO-1,2
CO-2	<b>Understand,Analyse and Apply the knowledge of the transmission dynamics of parasitic diseases:</b> Students will grasp the complex life cycles and transmission mechanisms of parasites and vectors, including the factors influencing their transmission dynamics and epidemiology.	R, U, An, Ap, E, Cr	PSO-1,2,5
CO-3	<b>Understand,Analyse and Apply the knowledge of the clinical manifestations and pathogenesis of parasitic infections:</b> Students will be able to analyze the clinical manifestations, pathogenesis, and impact of parasitic infections on human health, as well as understand the principles of diagnosis, treatment, and prevention.	R, U, An, Ap, E, Cr	PSO3,6

CO-4	<b>Understand, Analyse and Apply the knowledge of vector control strategies and public health interventions:</b> Students will evaluate the effectiveness of different vector control strategies and public health interventions in mitigating the spread of vector-borne diseases and reducing the burden of parasitic infections on affected populations.	R, U, An, Ap, E, Cr	PSO3
CO-5	<b>Understand, Analyse and Apply the knowledge of the global impact of parasitic diseases:</b> Students will critically evaluate the global impact of parasitic diseases on public health, socio-economic development, and environmental sustainability, as well as analyze the ethical and social dimensions of addressing parasitic infections in diverse contexts.	R, U, An, Ap, E, Cr	PSO3

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

**Name of the Course: Human Parasitology and Vector Borne Diseases**

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

CO No.	CO	PO/PSO	Cognitive Level	Knowledge Category	Lecture (L)/Tutorial (T)	Practical (P)
CO-1	Identify and classify common parasites and vectors: Students will demonstrate the ability to recognize and classify various parasites and vectors based on their morphological characteristics and taxonomic classification.	PSO-1,2 PO-6	R, U, An, Ap, E, Cr	F, C	L	P
CO-2	Understand the transmission dynamics of	PSO-1,2,5	R, U, An, Ap, E, Cr	F, P	L	P

	<p>parasitic diseases: Students will grasp the complex life cycles and transmission mechanisms of parasites and vectors, including the factors influencing their transmission dynamics and epidemiology.</p>					
CO-3	<p>Analyze the clinical manifestations and pathogenesis of parasitic infections: Students will be able to analyze the clinical manifestations, pathogenesis, and impact of parasitic infections on human health, as well as understand the principles of diagnosis, treatment, and prevention.</p>	PSO3,6	R, U, An, Ap, E, Cr	F,C,P	L	P
CO-4	<p>Evaluate vector control strategies and public health</p>	PSO3	R, U, An, Ap, E, Cr	F,C	L	

	<p>interventions: Students will evaluate the effectiveness of different vector control strategies and public health interventions in mitigating the spread of vector-borne diseases and reducing the burden of parasitic infections on affected populations.</p>					
CO-5	<p>Critically assess the global impact of parasitic diseases: Students will critically evaluate the global impact of parasitic diseases on public health, socio-economic development, and environmental sustainability, as well as analyze the ethical and social dimensions of addressing parasitic infections in</p>	<p>PSO3 PO6</p>	<p>R, U, An, Ap, E, Cr</p>		L	



	diverse contexts.					
--	-------------------	--	--	--	--	--

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

### Mapping of COs with PSOs and POs

	PS O1	PS O2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
<b>CO 1</b>	2	3	-	-	-	-	-	1	1	-	-	-	3	-	-
<b>CO 2</b>	2	3	-	-	3	-	-	-	-	2	-	-	-	-	-
<b>CO 3</b>	-	-	2	-	-	2	-	-	-	-	-	2	-	-	-
<b>CO 4</b>	-	-	2	-	-	-	-	-	-	-	3	-	-	-	-
<b>CO 5</b>	-	2	-	-	-	-	-	-	2	-	2	-	2	-	-

### Correlation Levels:

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

### Assessment Rubrics:

### Assignment/Seminar Topics:

1. Socio-economic and environmental factors influencing parasitic infections
2. Emerging and Re-emerging Parasitic Diseases
3. Global Climate Change and Vector-Borne Disease Emergence

4. Neglected, Tropical and Vector Borne Diseases
5. Impact of protozoan infections on public health in India
6. One Health approach to helminthic disease control in India

#### **Continuous Comprehensive Assessment**

1. Assignments
2. Seminar
3. Submission of Field/Project/Survey Report
4. Test

#### **End Semester Exam**

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	Field Report/Survey Report/Project Evaluation	End Semester Examinations
CO 1	✓	✓		✓
CO 2	✓	✓		✓
CO 3	✓	✓	✓	✓
CO 4		✓		✓
CO 5		✓		✓