Department of Zoology

Govt. V.Y.T. PG Autonomous College, Durg (C.G.)

Session 2025-26

Learning Outcome Based curriculum for M. Sc. Zoology

Program Specific Outcome (PSO): M. Sc. Zoology

The programme enables the students:

- To comprehend knowledge of biology in a diversity of organisms encompassing different ecosystem levels
- To develop practical skills and ability to perform experiments and analysis through appropriate application of statistical tools and technologies to obtain accurate results and thus gain the ability to solve problems.
- To develop cognitive and hands-on skills in advanced scientific methods and their uses in applied and advanced zoological sciences
- To connect, comprehend and apply the value of the diversity and complexity of animal life as revealed through studies on morphology, physiology, cellular and molecular biology and biochemistry.
- Acquire knowledge and critical analytical skills on different scientific arenas such as immunology, endocrinology, microbiology and genetics
- Be proficient at critical thinking, annotation and communication of scientific information and able to succeed in competitive examinations and interviews.

Name & Signature of Members of Board of Studies

Chair person/HOD: Dr. Usha Sahu	**Departmental Members**
Subject Expert	1. Dr. Divya K. Minj
Subject Expert	2. Dr. Neeru Agrawal
VC Nominee	3. Ms. Mausumi Dey
Member of other Department	4. Dr. Sanju Sinha
Industrial Representative	5. Dr. Alka Mishra
Student Nominee	6. Mr. Sudesh Sahu
	7. Mr. Anurag Mishra

Syllabus for M. Sc. Zoology by the Members of Board of Studies for session 2025-26

(MZO 101) Paper I: Biosystematics and Taxonomy	**(MZO 102) Paper II: Structure and Functions in Invertebrates**
(MZO 103) Paper III: Endocrinology	**(MZO 104) Paper IV: Cell and Molecular Biology**
MZOL 01, Lab Course I: Based on Paper I and II	**MZOL 02,Lab Course II: Based on Paper II I and IV**

Semester II

(MZO 201) Paper I: Population Genetics and Evolution	**(MZO 202) Paper II: Reproductive Biology**
(MZO 203) Paper III: Tools and Techniques in Biology	**(MZO 204) Paper IV: Environmental Physiology**
MZOL 03, Lab Course I: based on paper I and II	**MZOL 04, Lab Course II: Based on paper III and IV**

Semester III:

(MZO 301) Paper I: Comparative Anatomy of Vertebrates	**(MZO 302) Paper II: Biostatistics**
(MZO 303) Paper III: Ichthiology	**(MZO 304) Paper III B: Animal Behaviour**
MZOL 05, Lab Course I: Based on Paper I and II	**MZOL 06, Lab Course II: Based on Paper III and IV**

Semester IV:

(MZO 401) Paper I: Insect Biology	**(MZO 402) Paper II: Animal Physiology**
(MZO 403) Paper III : Population Ecology	**(MZO 404A) Paper IV A: Fisheries and Aquaculture (Elective)**
(MZO 404B) Paper IV B: Parasitology (Elective)	**(MZO 404C) Paper IV C: Economic Zoology (Elective)**
(MZO 404D) Paper IV C: Sericulture (Elective)	
MZOL 07, Lab Course I: Based on Paper I, II and III	**MZOL 08, Lab Course II: Project Work**
Any one elective course to be selected as paper IV	

Project Work: A project work to be done by each student based on theoretical and experimental works under allotted supervisor from the department. The project work shall be initiated at the beginning of semester IV.

Evaluation of Project work: The project report shall be submitted to the department with duly signed by the supervisor and the Head of the institution within stipulated time. Evaluation of the projects shall be done by external examiner through power point presentation by the students.

The Syllabus for M. Sc. Zoology is hereby approved for the sessions 2025-26

Name & Signature of Members of Board of Studies

Chair person/HOD: Dr. Usha Sahu	**Departmental Members**
Subject Expert	1. Dr. Divya K. Minj
Subject Expert	2. Dr. Neeru Agrawal
VC Nominee	3. Ms. Mausumi Dey
Member of other Department	4. Dr. Sanju Sinha
Industrial Representative	5. Dr. Alka Mishra
Student Nominee	6. Mr. Sudesh Sahu
	7. Mr. Anurag Mishra

GENERAL INSTRUCTIONS FOR STUDENTS

1. The candidate has to obtain minimum 20% marks in each theory paper and internal assessment separately.
2. The candidate has to secure minimum 36% marks as an aggregate in order to pass that semester examination.
3. The internal assessment shall include class test, home assignment and seminar presentation.
4. In internal assessment, the marks taken into consideration will be the average of two tests (i.e. the class test and the home assignment) for each paper and shall of 20 marks.
    a. The seminar shall be in lieu of class test and home assignment combined and shall be of 20 marks.
    b. There shall be one seminar in each semester.
    c. The marking of seminar shall be in terms of hard copy submission (10 marks) and presentation and open discussion (10 marks).

DIRECTIVES FOR STUDENTS, FACULTY AND EXAMINERS

1. There shall be three sections (Section A, B, and C) in each theory paper.
2. Section A shall contain very short answer type questions (One or two line answer) or objective type questions (fill in the blank, **not multiple choice questions).**
3. Section B shall contain short answer type questions with the limit of 250 words.
4. Section C shall contain long answer/ descriptive type questions. The students are required to answer precisely and the answer should not exceed the limit of 450 words.
5. The students are required to study the content mentioned in the curriculum exhaustively.

EVALUATION PATTERN

- **Theory 80 marks = 04 Credits**

Question Pattern	Unit I	Unit II	Unit III	Unit IV
Very short answer type questions. (2 Questions from each Unit without internal choice). Maximum in two sentences.	2X2 = 4 Marks	2X2 = 4 Marks	2X2 = 4 Marks	2X2 = 4 Marks
Short answer type question. Attempt one question from each unit with internal choice Word limit 200-250	1X4 = 4 Marks	1X4 = 4 Marks	1X4 = 4 Marks	1X4 = 4 Marks
Long answer type question. Attempt one question from each unit with internal choice. Word limit 400-450	1X12 = 12 Marks	1X12 = 12 Marks	1X12 = 12 Marks	1X12 = 12 Marks

Internal Assessment 20 marks = 01 credit

- Unit test – One class test in each theory paper comprising 20 marks. (containing two short answer type questions of 05 marks each and 05 objective type questions of 10 marks).
- Home assignments – Two long answer type questions from each theory paper containing 10 marks each. The answer should be prepared with the help of standard reference books. (The titles of those books, authors, year of publication and publishers details should be mentioned in an appropriate way, at the end of each assignment).
- Seminar presentations (Power point) – Comprising 20 marks.

  Each student has to be prepare one seminar in each semester. The marking of seminar shall be in terms of hard copy submission (10 marks) and presentation and open discussion (10 marks).

- **Practical 200 marks = 08 credits**

  Two practicals of 100 marks each

CREDIT ALLOTMENTS

- Theory Paper = 05 credits (04+01)
- Practical = 04/ 08 credits

TOTAL CREDITS/ SEMESTER

- Science Subjects with 04 theory papers (100 each) and one /two practical (100 each) – 20 + 08 = 28 credits
- Science Subjects with 05 theory papers (no practical-Maths) – 25 credits
- Arts Subjects with 04 theory papers – 20 credits
- Arts Subjects with 05 theory papers – 25 credits
- Commerce subject with 05 theory papers – 25 credits

TOTAL CREDITS / PROGRAMME

- 16 Theory + 08 Practical + Project work – 80 + 32 + 08 = 120 credits
- 20 Theory – 100 credits (Maths)
- 20 Theory – 100 credits (Arts and Commerce)
- 16 Theory – 80 credits (Arts)

Name & Signature of Members of Board of Studies

Chair person/HOD: Dr. Usha Sahu	**Departmental Members**
Subject Expert	1. Dr. Divya K. Minj
Subject Expert	2. Dr. Neeru Agrawal
VC Nominee	3. Ms. Mausumi Dey
Member of other Department	4. Dr. Sanju Sinha
Industrial Representative	5. Dr. Alka Mishra
Student Nominee	6. Mr. Sudesh Sahu
	7. Mr. Anurag Mishra

DEPARTMENT OF ZOOLOGY
GOVT. V.Y.T. PG AUTONOMOUS COLLEGE DURG
Approved syllabus for M. Sc. ZOOLOGY
by the members of Board of Studies for the
Session 2025-26

Syllabus and Marking Scheme for Semester IV (2025 -26)

Paper No.	Title of the Paper	Marks Allotted in Theory		Marks Allotted in Internal Assessment		Credits
		Max	Min	Max.	Min.	
I	**MZO 401/INSECT BIOLOGY**	80	16	20	04	05
II	**MZO 402/ANIMAL PHYSIOLOGY**	80	16	20	04	05
III	**MZO 403/POPULATION ECOLOGY**	80	16	20	04	05
IV	**MZO 404/ELECTIVE COURSE** **A.** FISHERIES AND AQUACULTURE **B.** PARASITOLOGY **C.** ECONOMIC ZOOLOGY **D.** SERICULTURE (Any one course opted by student)	80	16	20	04	05
V	**MZOL 07, Lab Course I** **INSECT BIOLOGY** **ANIMAL PHYSIOLOGY** **FISHERIES AND AQUACULTURE OR PARASITOLOGY OR ECONOMIC ZOOLOGY OR SERICULTURE**	100	33			04
IV	**MZOL 08, Lab Course II** **PROJECT WORK**	100	33			04
	Total	**520**		**80**		**28**

04 Theory papers	**-**	**320**
04 Internal Assessment	**-**	**80**
01 Practical	**-**	**100**
01 Project	**-**	**100**
Total Marks	**-**	**600**
Credits	**-**	**28**

GOVT. V.Y.T. PG AUTONOMOUS COLLEGE DURG
M. Sc. ZOOLOGY
Semester - IV
SESSION 2025-2026
PAPER- I
Course Code - MZO401
INSECT BIOLOGY

Max.M.- 80
Min. M.-16

UNIT-I

General characters and Classification of insects (up to order)

- Segmentation in insects
- Mouth parts in insects
- Social organization in insects (Ants and Termites)
- Economic importance of insects

Digestive System

- Alimentary canal and associated glands
- Physiology of digestion
- Metabolism

UNIT-II

Respiratory System

- Respiration in terrestrial insects
- Respiration in aquatic insects
- Endo-parasitic respiration in insects

Circulatory System

- Haemocyte and Haemolymph
- Connective tissue.
- Plasma.

Nervous System

- Structure of Nervous System.
- Physiology of Nervous System.

UNIT-III

Excretory System

- Excretory organs in insects.
- Nitrogenous excretion.
- Salt & water regulation.

Physiology of Sonification

- Mechanism of sound production.
- Significance of sound production.
- Control of sound production.

Physiology of vision

- Structure of compound eye.
- Functioning of the eye.

Muscular System

- Structure of muscles in insects.
- Physiology of insect muscle.

UNIT-IV

Reproductive system

- Male and female reproductive organs.
- Development, Growth and Metamorphosis in grasshopper and Butterfly.
- Pheromones

Pest management

- Pest of rice, sugarcane and pulses
- Classification of insecticides
- Chemical control of insect pest
- Biological control of insect pest

SUGGESTED READING MATERIALS - (ALL LATEST EDITION).

1. **Basic & applied Entomology –** Nayar.
2. **Comparative Entomology** – R. F. Chaipman.
3. **Entomology** – Barrington.
4. **Entomology** – Lefroy.

Course Outcomes

After successful completion of these courses the student would be able:

- To receive an understanding of general characters, structure and physiology of insects.
- To explain the physiology of different system of insects.
- To gain knowledge about beneficial and non-beneficial insects.
- To learn the skills of identification, seasonal history, biology, nature of damage and control measures of pests, of cereals, pulse crops, cotton, vegetables, oil seeds, fruit crops, sugarcane and stored grains
- To understand the methods to effectively eliminate harmful insects by mode of action of chemical or biological insecticide.

EVALUATION PATTERN

- **Theory 80 marks = 04 Credits**

Question Pattern	Unit I	Unit II	Unit III	Unit IV
Very short answer type questions. (2 Questions from each Unit without internal choice). Maximum in two sentences.	2X2 = 4 Marks	2X2 = 4 Marks	2X2 = 4 Marks	2X2 = 4 Marks
Short answer type question. Attempt one question from each unit with internal choice Word limit 200-250	1X4 = 4 Marks	1X4 = 4 Marks	1X4 = 4 Marks	1X4 = 4 Marks
Long answer type question. Attempt one question from each unit with internal choice. Word limit 400-450	1X12 = 12 Marks	1X12 = 12 Marks	1X12 = 12 Marks	1X12 = 12 Marks

The syllabus for Paper I (M. Sc. ZOOLOGY, Sem. - IV) is hereby approved for theSession 2025 -26

Name & Signature of Members of Board of Studies

Chair person/HOD: Dr. Usha Sahu	**Departmental Members**
Subject Expert	1. Dr. Divya K. Minj
Subject Expert	2. Dr. Neeru Agrawal
VC Nominee	3. Ms. Mausumi Dey
Member of other Department	4. Dr. Sanju Sinha
Industrial Representative	5. Dr. Alka Mishra
Student Nominee	6. Mr. Sudesh Sahu
	7. Mr. Anurag Mishra

GOVT. V.Y.T. PG AUTONOMOUS COLLEGE DURG
M. Sc. ZOOLOGY
Semester - IV
SESSION 2025-2026
PAPER- II
Course Code – MZO402
Animal physiology

Max.M.- 80

UNIT-I Min. M.-16

Circulation

- Composition of blood, Structure & functions of its constituents
- Blood groups, Blood coagulation, Anti coagulants
- Blood transfusion
- Hemoglobin & its polymorphism, Anemia
- Physiological Anatomy of Heart
- Divisions of Circulation: Systemic and pulmonary circulation
- Capillary fluid exchange
- Neural and hormonal control of heart
- Auto regulation mechanism in heart
- Cardiac output and vascular reflexes
- Lymphatic circulation

UNIT-II

Respiration

- Mechanism of Gas exchange and transport
- Hypoxia, Physiology of hypo-barrism in high altitude
- Neural and Chemical control of respiration
- Work & exercise physiology
- Respiration in Birds

Immunology

- Definition and types of immunity
- Innate and acquired immunity
- Lymphoid organ and Immune cells
- Immunoglobulines, Complements and Major Histocompatibility Complex (MHC)
- Autoimmunity and Immunodeficiency diseases
- Immune response against bacterial(TB), Parasitic(Malaria) and Viral(HIV) infections,
- Immuno-prophylaxis

UNIT-III

Excretion

- Structure and function of Kidney and Nephron
- Mechanism of urine formation: Glomerular filtration: GFR and factors affecting GFR, Tubular reabsortion and Secretion
- Renal Circulation
- Regulation of acid base balance by kidney
- Renal regulation of body fluids: Role of ADH and RAAS (Rennin-Angiotensin- Aldosteron System)
- Mechanism of Micturition, Cystometrogram
- Renal failure:Uremia
- Renal function in Birds
- Bioluminescence: Chemical basis and Biological significance

UNIT-IV

MUSCLE PHYSIOLOGY

- Muscle types
- Neuro- muscular junction
- Mechanism of muscle contraction
- Muscular fatigue

NERVE PHYSIOLOGY

- Neurons
- Action potential
- Conduction of nerve impulses
- Neural control of muscle tone and posture

SUGGESTED READING MATERIALS - (ALL LATEST EDITION).

1. **Comparative Animal Physiology:** Prosser and Brown, Saunders.
2. **Human Physiology:** C.C. Chatterjee, Medical Allied Agency, Calcutta.
3. **Text book of Medical Physiology:** Guyton and Hall, Saunders.
4. **Essentials of Medical Physiology:** K. Sembulingam &P. Sembulingam.
5. **Immunology: An Introduction:** Ian R. Tizard, 4th Edition, Saunders College Publishing.

Course Outcomes

After successful completion of these courses the student would be able:

- To gain an integrated understanding of physiological mechanisms
- To learn the physiology of digestive and respiratory system of human beings.
- To understood the blood composition, types, groups and circulatory system.
- To described the physiology of excretory system and nervous system of human beings
- To know the physiology of sense organs, muscles and reproductive system.

EVALUATION PATTERN

➢ **Theory 80 marks = 04 Credits**

Question Pattern	Unit I	Unit II	Unit III	Unit IV
Very short answer type questions. (2 Questions from each Unit without internal choice). Maximum in two sentences.	2X2 = 4 Marks	2X2 = 4 Marks	2X2 = 4 Marks	2X2 = 4 Marks
Short answer type question. Attempt one question from each unit with internal choice Word limit 200-250	1X4 = 4 Marks	1X4 = 4 Marks	1X4 = 4 Marks	1X4 = 4 Marks
Long answer type question. Attempt one question from each unit with internal choice. Word limit 400-450	1X12 = 12 Marks	1X12 = 12 Marks	1X12 = 12 Marks	1X12 = 12 Marks

The syllabus for Paper II (M. Sc. ZOOLOGY, Sem. - IV) is hereby approved for theSession 2025 -26

Name & Signature of Members of Board of Studies

Chair person/HOD: Dr. Usha Sahu	**Departmental Members**
Subject Expert	1. Dr. Divya K. Minj
Subject Expert	2. Dr. Neeru Agrawal
VC Nominee	3. Ms. Mausumi Dey
Member of other Department	4. Dr. Sanju Sinha
Industrial Representative	5. Dr. Alka Mishra
Student Nominee	6. Mr. Sudesh Sahu
	7. Mr. Anurag Mishra

GOVT. V.Y.T. PG AUTONOMOUS COLLEGE DURG
M. Sc. ZOOLOGY
Semester - IV
SESSION 2025-2026
Paper – III
Course Code - MZO403
POPULATION ECOLOGY

Max.M.- 80
Min. M.-16

UNIT-1

Demography

- Life tables – definition, construction & uses.
- Survivorship curves – Types & uses

Population density –

- Definition & different methods for determining population density
- Fecundity
- Natality (Birth rate)
- Mortality (Death rate**)**

Population Growth

- Growth forms of population (exponential growth)
- Growth rate of population

UNIT-II

Population dispersal - Migration

- Emigration
- Immigration

Regulation of population size

- Extrinsic & Intrinsic mechanism
- Population cycle

Age distribution of population

- Age pyramids – different types & uses
- Age ratio
- Biotic potential and environmental resistance
- Methods of measuring the age of population

UNIT -III

Reproductive strategies

- R & K selection
- Breeding age and Sex ratio

Concept of Niche

- Habitat & niche
- Niche segregation

Competition - Intra specific & inter specific competition

Concept of Limiting Factors

- Liebig's law of minimum
- Shelford's law of tolerance
- Limiting factors & population control

UNIT –IV

Positive Interaction

- **Neutralism** – definition & different examples
- **Commensalisms** - definition & different examples
- **Proto Co-operation** - definition & different examples
- **Mutualism** - definition & different examples

Negative Interaction

- Predation – Definition & different examples
- Role of Predations in nature
- Components of Predation

Parasitism

- Host parasite relationship
- Parasitic adaptations
- Antibiosis

SUGGESTED READING MATERIALS - (ALL LATEST EDITION).

1. **Ecology with special reference to animal & man:** S. Charles, Kendeigh, Prentice hall of India Pvt. Ltd. New Delhi.
2. **Elements Of Tropical Ecology:** Yanney Ewusie, English language Book Society, Heine mann educational book publication.
3. **Fundamentals Of Ecology:** Odum P.

Course Outcomes

After successful completion of these courses the student would be able:

- To understand the characteristics of population and population dynamics.
- To explain the concept of illustration, coexistence and interactions among different species
- To make aware and responsible for surrounding nature.

EVALUATION PATTERN

- **Theory 80 marks = 04 Credits**

Question Pattern	Unit I	Unit II	Unit III	Unit IV
Very short answer type questions. (2 Questions from each Unit without internal choice). Maximum in two sentences.	2X2 = 4 Marks	2X2 = 4 Marks	2X2 = 4 Marks	2X2 = 4 Marks
Short answer type question. Attempt one question from each unit with internal choice Word limit 200-250	1X4 = 4 Marks	1X4 = 4 Marks	1X4 = 4 Marks	1X4 = 4 Marks
Long answer type question. Attempt one question from each unit with internal choice. Word limit 400-450	1X12 = 12 Marks	1X12 = 12 Marks	1X12 = 12 Marks	1X12 = 12 Marks

The syllabus for Paper III (M. Sc. ZOOLOGY, Sem. - IV) is hereby approved for theSession 2025 -26

Name & Signature of Members of Board of Studies

Chair person/HOD: Dr. Usha Sahu	**Departmental Members**
Subject Expert	1. Dr. Divya K. Minj
Subject Expert	2. Dr. Neeru Agrawal
VC Nominee	3. Ms. Mausumi Dey
Member of other Department	4. Dr. Sanju Sinha
Industrial Representative	5. Dr. Alka Mishra
Student Nominee	6. Mr. Sudesh Sahu
	7. Mr. Anurag Mishra

GOVT. V.Y.T. PG AUTONOMOUS COLLEGE DURG
M. Sc. ZOOLOGY
Semester - IV
SESSION 2025-2026
Paper – IV (Elective)
Course Code – MZO404A
FISHERIES AND AQUACULTURE

Max.M.- 80

UNIT-1 Min. M.-16

General character and identification of Indian Major Carps (Catla, Labeo, Mrigala, Channa, Tilapea, Gobius and Punctus)

Physico-Chemical and Biological factors in fish culture

Fresh water fish culture

- Construction and maintenance of fish farm.
- Management of ponds
- Aquatic weeds and their control

Fresh water fish breeding

- Dry and Wet bundh breeding
- Induced breeding
- Hatchery: types and their utilization

UNIT – II

Inland Fisheries

- Riverine fisheries
- Lakesterine Fisheries
- Coldwater Fisheries
- Estuarine Fisheries
- Marine Fisheries

Fish seed for stocking and transport

Fishing methods, Fish gears, crafts and nets

UNIT –III

- Composite Fish Culture and Integrated fish farming
- Fish cum paddy culture
- Fish cum poultry culture
- Sewage fed fisheries

UNIT-IV

- Aquarium maintenance for fresh water fishes
- Fish diseases and their control
- Fish preservation and processing
- Economic value of fishes
- Prawn and Pearl culture

SUGGESTED READING MATERIALS (ALL LATEST EDITION)

1. An introduction to Fishes by S.S. Khanna, Silver Line Publication, Allahabad.
2. Environmental stress and fish disease by Wedmeyer, Meyer Smith, Narendra Publishing House, New Delhi.
3. Fishery and Inland Fisheries by C.B.L. Shrivastava, Kitab Mahal.
4. General and applied Ichthyology(Fish and Fisheries) by S.K. Gupta, P.C. Gupta, S.Chand & Co, Ram Nagar, New Delhi.
5. Fish and Fisheries By Pandey and Shukla, Rastogi Publication , Meerut.
6. A Text book of Fish Biology and Indian Fisheries By Rahul P. Parihar, Central Publishing House, Allahabad.
7. Fish and Fisheries By Jhingran, Hindustan Publishing Coorporation, Delhi.

Course Outcomes

After successful completion of these courses the student would be able:

- To understand about the economically important fishes and physico-chemical and biological parameters for successful fish culture
- To understand the scope of Inland fisheries and use of nets and gears in fish capture
- To understand the Composite Fish Culture and Integrated fish farming technology and also the utility of different farming systems for sustainable fish culture
- To gain knowledge of ornamental or aquarium fish breeding
- To explain the preservation techniques for fishes and disease control measures
- To understand the scope of aquaculture

EVALUATION PATTERN

- **Theory 80 marks = 04 Credits**

Question Pattern	Unit I	Unit II	Unit III	Unit IV
Very short answer type questions. (2 Questions from each Unit without internal choice). Maximum in two sentences.	2X2 = 4 Marks	2X2 = 4 Marks	2X2 = 4 Marks	2X2 = 4 Marks
Short answer type question. Attempt one question from each unit with internal choice Word limit 200-250	1X4 = 4 Marks	1X4 = 4 Marks	1X4 = 4 Marks	1X4 = 4 Marks
Long answer type question. Attempt one question from each unit with internal choice. Word limit 400-450	1X12 = 12 Marks	1X12 = 12 Marks	1X12 = 12 Marks	1X12 = 12 Marks

The syllabus for Paper IV (Elective MZO404 A) (M. Sc. ZOOLOGY, Sem. - IV) is hereby approvedfor the Session 2025 -26

Name & Signature of Members of Board of Studies

Chair person/HOD: Dr. Usha Sahu	**Departmental Members**
Subject Expert	1. Dr. Divya K. Minj
Subject Expert	2. Dr. Neeru Agrawal
VC Nominee	3. Ms. Mausumi Dey
Member of other Department	4. Dr. Sanju Sinha
Industrial Representative	5. Dr. Alka Mishra
Student Nominee	6. Mr. Sudesh Sahu
	7. Mr. Anurag Mishra

GOVT. V.Y.T. PG AUTONOMOUS COLLEGE DURG
M. Sc. ZOOLOGY
Semester - IV
SESSION 2025-2026
Paper – IV (Elective)
Course Code – MZO404B
PARASITOLOGY

Max.M.- 80
Min. M.-16

UNIT-1

Types of parasites, types of hosts, inter relationship between host and parasite, Responses of hosts to parasitic infection, mode of transmission of parasite, host specificity and parasitic adaptation

UNIT II

Vibrio cholera: life cycle, mode of transmission, infection and treatment

Yersinia pestis: life cycle, mode of transmission, infection and treatment

Influenza and H1N1 viruses: life cycle, mode of transmission, infection and treatment

Dengue - life cycle, mode of transmission, infection and treatment

UNIT III

Vectors: definition and types of vector, Arthropod vector of medical and veterinary importance, sand flies, mosquitoes, horse flies and Rat flea, ticks, mites and vector control

UNIT – IV

Study of parasites from Protozoa & Nematoda

1. Trypanosoma of humans
2. Intestinal flagellates Giardia
3. General life cycle of cestodes :Taenia
4. General Life Cycle of Schistosoma and fasciola
5. General Life Cycle of Wuchereria and Ancylostoma

Plant nematodes: Cyst nematode

REFERENCE BOOKS:

1. Ramnik Sood, 1993. Parasitology, C.B.S. Publisher, New Delhi.
2. K.D. Chaterjee, 1987. Parasitology, Medical Publisher Calcutta.
3. Hobler, E.R., and Noble, G.A., 1982. Parasitology 2nd Edition, Lea & Febieger U.S.A
4. Smit. D.G., 1997. Introduction Animal Parasitology 2nd Edition, Johns Willey Sons New York.
5. Soulsby, E.J.L., 1969. Helminths, Arthropods & Protozoa of Domesticated Animals, ELBS Publication London Ed.

Course Outcomes

After successful completion of these courses the student would be able:

- To understand about the mode of transmission of parasites and their interrelationship with host
- To know about the viral diseases and their treatments
- To understand the medical and veterinary important insect vectors and their control
- To gain knowledge about diseases caused by protozoans and helminthes

EVALUATION PATTERN

- **Theory 80 marks = 04 Credits**

Question Pattern	Unit I	Unit II	Unit III	Unit IV
Very short answer type questions. (2 Questions from each Unit without internal choice). Maximum in two sentences.	2X2 = 4 Marks	2X2 = 4 Marks	2X2 = 4 Marks	2X2 = 4 Marks
Short answer type question. Attempt one question from each unit with internal choice Word limit 200-250	1X4 = 4 Marks	1X4 = 4 Marks	1X4 = 4 Marks	1X4 = 4 Marks
Long answer type question. Attempt one question from each unit with internal choice. Word limit 400-450	1X12 = 12 Marks	1X12 = 12 Marks	1X12 = 12 Marks	1X12 = 12 Marks

The syllabus for Paper IV (Elective MZO404 B) (M. Sc. ZOOLOGY, Sem. - IV) is hereby approvedfor the Session 2025 -26

Name & Signature of Members of Board of Studies

Chair person/HOD: Dr. Usha Sahu	**Departmental Members**
Subject Expert	1. Dr. Divya K. Minj
Subject Expert	2. Dr. Neeru Agrawal
VC Nominee	3. Ms. Mausumi Dey
Member of other Department	4. Dr. Sanju Sinha
Industrial Representative	5. Dr. Alka Mishra
Student Nominee	6. Mr. Sudesh Sahu
	7. Mr. Anurag Mishra

GOVT. V.Y.T. PG AUTONOMOUS COLLEGE DURG
M. Sc. ZOOLOGY
Semester - IV
SESSION 2025-2026
Paper – IV (Elective)
Course Code – MZO404C
ECONOMIC ZOOLOGY

Max.M.- 80
Min. M.-16

UNIT-1 Vermiculture

Introduction, Types of earthworm, Biology of Eisenia foetida, Rearing of earthworms, Equipments,devices used in vermiculture, Vermicompost Technology, Methods and products, Vermiwash Collection, Composition & use

UNIT II Apiculture and Prawn Culture

Morphology and Biology of honey bees, Honey bee species, social behavior of honey bees, Bee keeping and ancillary industries, Newton's Bee hive Extraction of honey, Medicinal value of honey, bee products, Importance of bee colonies in crop pollination

Prawn Culture: Types of prawn fishery, Culture of fresh water prawn, Culture of marine prawn, Preparation of farm. Preservation, processing and export of prawn

UNIT III Fish culture

Aim of fish culture, Breeding Pond, Fish Seed, Hatching pond, Transport of fish fry to rearing ponds, Harvesting, Preservation of fish, Composite fish forming, By-products of fishing industry

UNIT IV Poultry Management

Breeds of fowl, Housing and Equipment, Deep litter System, Laying cages, Methods of brooding and Rearing, Debeaking. Management of growers, Layers, Broilers, Feed formulations for chicks, Growers and Broilers, Diseases of fowl, Nutritive value of egg and meet, Incubation and hatching of eggs

REFERENCE BOOKS

1. Vasantharaj David, B. and Kumaraswami T., 1998. Elements of Economic Entomology Pop. Book Depot. Chennai.
2. Bhatnagar, R.K. and Palpa, R.K. 1996 Vermiculture and Vermicomposting, Kalyani Publishers, New Delhi.
3. Arul K. Sharma, A Hand book of Organic farming, Agro, Bio. Jothpur, India.
4. Shukla, G.S. and Xupadhyay G.S. Economic Zoology, Rastogi Publications, Meerut.
5. Arumugam, N. 2008. Aquaculture, Saras Publication Nagarkoli, Tamilnadu.
6. Shanmugam, K. 1992. Fishery Biology and Aquaculture LEO Pathipagam, Chennai.

Course Outcomes

After successful completion of these courses the student would be able:

- To cultivate skills to understand vermiculture
- To learn the techniques of apiculture and prawn culture
- To develop technical skills on culture, rearing, harvesting and marketing management
- To gain knowledge about poultry management

EVALUATION PATTERN

- **Theory 80 marks = 04 Credits**

Question Pattern	Unit I	Unit II	Unit III	Unit IV
Very short answer type questions. (2 Questions from each Unit without internal choice). Maximum in two sentences.	2X2 = 4 Marks	2X2 = 4 Marks	2X2 = 4 Marks	2X2 = 4 Marks
Short answer type question. Attempt one question from each unit with internal choice Word limit 200-250	1X4 = 4 Marks	1X4 = 4 Marks	1X4 = 4 Marks	1X4 = 4 Marks
Long answer type question. Attempt one question from each unit with internal choice. Word limit 400-450	1X12 = 12 Marks	1X12 = 12 Marks	1X12 = 12 Marks	1X12 = 12 Marks

The syllabus for Paper IV (Elective MZO404 C) (M. Sc. ZOOLOGY, Sem. - IV) is hereby approvedfor the Session 2025 -26

Name & Signature of Members of Board of Studies

Chair person/HOD: Dr. Usha Sahu	**Departmental Members**
Subject Expert	1. Dr. Divya K. Minj
Subject Expert	2. Dr. Neeru Agrawal
VC Nominee	3. Ms. Mausumi Dey
Member of other Department	4. Dr. Sanju Sinha
Industrial Representative	5. Dr. Alka Mishra
Student Nominee	6. Mr. Sudesh Sahu
	7. Mr. Anurag Mishra

GOVT. V.Y.T. PG AUTONOMOUS COLLEGE DURG
M. Sc. ZOOLOGY
Semester - IV
SESSION 2025-2026
Paper – IV (Elective)
Course Code – 404D
SERICULTURE

Max.M.- 80
Min. M.-16

UNIT-1: General Aspects of Silkworms

Types of Silkworms: Mulberry, tasar, muga, and eri

Morphology and life cycle of silkworms, Races of mulberry silkworms, Voltinism

UNIT II Mulberry Cultivation

Selection of land and cultivation of mulberry, Different methods of planting, Organic and Inorganic manure application, Pruning, Harvest and preservation of leaves, Pest and disease of mulberry and their control measures

UNIT III Silkworm Rearing

Disinfection of rearing houses and appliances, Egg handling, Hatching, Brushing, Silkworm rearing techniques, Shoot harvest method of rearing, Spacing and leaf requirement in different stages, Pest and disease of silkworm and preventive measures, Spinning and mounting, Harvesting of cocoon and cocoon assessment, Transportation and marketing

UNIT IV Grainage Techniques

Egg production, Acid treatment of hibernating eggs, Loose egg production, Grainage techniques, Materials required for a grainage

Reeling methods, Re-reeling, Silk examination, cleaning, lacing, skeining, book making, Grainage of Silk.

REFERENCE BOOKS

1. Rangasamy, G. 1987. Manual on Sericulture FAO, Vol. I to IV, Agriculture service bulletin,CSB, Bangalore, India.

2. Dandin, S.B. 2004. Hand book of New Sericulture technologies, Central Silk Board, Bangalore.

3. Ganga G. and J. Sulochana Chetiy, 2005. An Introduction to Sericulture 2nd Edition, Oxford and IBH Publishers & Co. New Delhi.

Course Outcomes

After successful completion of these courses the student would be able:

- To understand the different kinds of silk
- To learn the techniques of cultivation of Mulberry
- To gain knowledge about cocoon harvesting technology
- To develop technical skills on culture, rearing, harvesting and marketing management

M.Sc. ZOOLOGY (2025-26)
SEMESTER – IV
MZOL 07, LAB COURSE-7
(Syllabus & Scheme of Marks allotment in Practical examination)

1. Collection and identification of insects.
2. Study of permanent slides of insects.
3. Exercise based on population ecology.
4. Exercise based on animal physiology.
5. Collection and identification of fishes/internal parasites of fish, frog and goat/earthworms/bees (according to the elective paper opted by the student).
6. Study of permanent slides of fishes/ parasites/earthworms/bees (according to the elective paper opted by the student).

EXAMINATION SCHEME

SN	EXERCISES	Marks
1.	Identification of insects	10
2.	Exercise based on population ecology	10
3.	Exercise based on animal physiology	10
4.	Identification of fishes or internal parasites or earthworms and bees (according to the elective paper opted by the student).	10
5.	Exercise based on histology	05
6.	Spotting	20
7.	Viva	15
8.	Sessional	20
9.	Total -	100

Course Outcomes

After successful completion of these courses the student would be able:

- To explain the preservation techniques for fishes and disease control measures

- To cultivate skills to understand vermiculture
- To learn the techniques of apiculture and prawn culture
- To develop technical skills on culture, rearing, harvesting and marketing management
- To gain knowledge about poultry management

M.Sc. ZOOLOGY (2025-26)
SEMESTER – IV
MZOL 08, LAB COURSE - 8
(Syllabus & Scheme of Marks allotment in Practical examination)

PROJECT WORK – 100 MARKS

- Project work to be done by each student based on theoretical and experimental works.
- Evaluation of project work will be according to following criteria:

EVALUATION SCHEME

S.NO.	CRITERIA	MARKS
1.	Relevance of the topic	10
2.	Write-up on standard parameters	50
3.	Presentation skill	30
4.	Discussion	10
TOTAL -		**100**

The syllabus for lab. Course M. Sc. ZOOLOGY, Sem. - IV is hereby approved for theSession 2025 -26

Name & Signature of Members of Board of Studies

Chair person/HOD: Dr. Usha Sahu	**Departmental Members**
Subject Expert	1. Dr. Divya K. Minj
Subject Expert	2. Dr. Neeru Agrawal
VC Nominee	3. Ms. Mausumi Dey
Member of other Department	4. Dr. Sanju Sinha
Industrial Representative	5. Dr. Alka Mishra
Student Nominee	6. Mr. Sudesh Sahu
	7. Mr. Anurag Mishra

GENERAL INSTRUCTIONS FOR STUDENTS

1. The candidate has to obtain minimum 20% marks in each theory paper and internal assessment separately.
2. The candidate has to secure minimum 36% marks as an aggregate in order to pass that semester examination.
3. The internal assessment shall include class test, home assignment and seminar presentation.
4. In internal assessment, the marks taken into consideration will be the average of two tests (i.e. the class test and the home assignment) for each paper and shall of 20 marks.
   a. The seminar shall be in lieu of class test and home assignment combined and shall be of 20 marks.
   b. There shall be one seminar in each semester.
   c. The marking of seminar shall be in terms of hard copy submission (10 marks) and presentation and open discussion (10 marks).

DIRECTIVES FOR STUDENTS, FACULTY AND EXAMINERS

1. There shall be three sections (Section A, B, and C) in each theory paper.
2. Section A shall contain very short answer type questions (One or two line answer) or objective type questions (fill in the blank, **not multiple choice questions).**
3. Section B shall contain short answer type questions with the limit of 250 words.
4. Section C shall contain long answer/ descriptive type questions. The students are required to answer precisely and the answer should not exceed the limit of 450 words.
5. The students are required to study the content mentioned in the curriculum exhaustively.

EVALUATION PATTERN

- **Theory 80 marks = 04 Credits**

Question Pattern	Unit I	Unit II	Unit III	Unit IV
Very short answer type questions. (2 Questions from each Unit without internal choice). Maximum in two sentences.	2X2 = 4 Marks	2X2 = 4 Marks	2X2 = 4 Marks	2X2 = 4 Marks
Short answer type question. Attempt one question from each unit with internal choice Word limit 200-250	1X4 = 4 Marks	1X4 = 4 Marks	1X4 = 4 Marks	1X4 = 4 Marks
Long answer type question. Attempt one question from each unit with internal choice. Word limit 400-450	1X12 = 12 Marks	1X12 = 12 Marks	1X12 = 12 Marks	1X12 = 12 Marks

Internal Assessment 20 marks = 01 credit

- Unit test – One class test in each theory paper comprising 20 marks. (containing two short answer type questions of 05 marks each and 05 objective type questions of 10 marks).
- Home assignments – Two long answer type questions from each theory paper containing 10 marks each. The answer should be prepared with the help of standard reference books. (The titles of those books, authors, year of publication and publishers details should be mentioned in an appropriate way, at the end of each assignment).
- Seminar presentations (Power point) – Comprising 20 marks.

  Each student has to be prepare one seminar in each semester. The marking of seminar shall be in terms of hard copy submission (10 marks) and presentation and open discussion (10 marks).

➢ **Practical 200 marks = 08 credits**

Two practicals of 100 marks each

CREDIT ALLOTMENTS

- Theory Paper = 05 credits (04+01)
- Practical = 04/ 08 credits

TOTAL CREDITS/ SEMESTER

- Science Subjects with 04 theory papers (100 each) and one /two practical (100 each) – 20 + 08 = 28 credits
- Science Subjects with 05 theory papers (no practical-Maths) – 25 credits
- Arts Subjects with 04 theory papers – 20 credits
- Arts Subjects with 05 theory papers – 25 credits
- Commerce subject with 05 theory papers – 25 credits

TOTAL CREDITS / PROGRAMME

- 16 Theory + 08 Practical + Project work – 80 + 32 + 08 = 120 credits
- 20 Theory – 100 credits (Maths)
- 20 Theory – 100 credits (Arts and Commerce)

16 Theory – 80 credits (Arts)

The syllabus (M. Sc. ZOOLOGY, Sem. - IV) is hereby approved for theSessions 2025 -26

Name & Signature of Members of Board of Studies

Chair person/HOD: Dr. Usha Sahu	**Departmental Members**
Subject Expert	1. Dr. Divya K. Minj
Subject Expert	2. Dr. Neeru Agrawal
VC Nominee	3. Ms. Mausumi Dey
Member of other Department	4. Dr. Sanju Sinha
Industrial Representative	5. Dr. Alka Mishra
Student Nominee	6. Mr. Sudesh Sahu
	7. Mr. Anurag Mishra