

DEPARTMENT OF ZOOLOGY

COURSE CURRICULUM & MARKING SCHEME

M.Sc. ZOOLOGY

Semester - I

SESSION : 2024-25



ESTD: 1958

GOVT. V.Y.T. PG AUTONOMOUS COLLEGE, DURG, 491001 (C.G.)

(Former Name – Govt. Arts & Science College, Durg)

NAAC Accredited Grade A⁺, College with CPE - Phase III (UGC), STAR COLLEGE (DBT)

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Department of Zoology
Govt. V.Y.T. PG Autonomous College, Durg (C.G.)
Session 2024-25

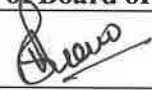

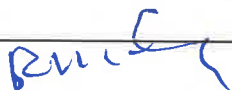
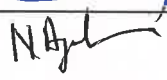
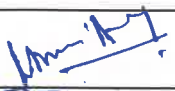
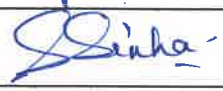
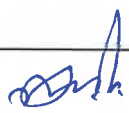



Learning Outcome Based curriculum for M. Sc. Zoology

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

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 2024-25 Semester I

(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: Ichthyology	(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:






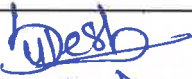
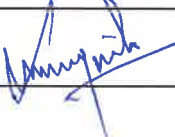
(MZO 401) Paper I: Insect Biology	(MZO 402) Paper II: Animal Physiology
(MZO 403) Paper III : Population Ecology	(MZO 404A) Paper IV A: Fisheries and Aquaculture (Elective)
(MZO 404B) Paper IV B: Parasitology (Elective)	(MZO 404C) Paper IV C: Economic Zoology (Elective)
(MZO 404D) Paper IV C: Sericulture (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 2024-25

Name & Signature of Members of Board of Studies

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Subject Expert		1. Dr. Divya K. Minj 
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Member of other Department		4. Dr. Sanju Sinha 
Industrial Representative		5. Dr. Alka Mishra
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		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 practical of 100 marks each

CREDIT ALLOTMENTS

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

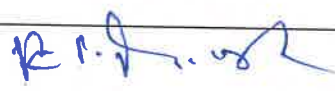
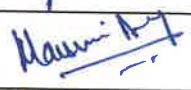
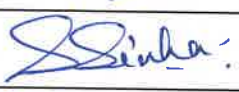

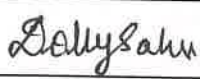

TOTAL CREDITS/ SEMESTER

- 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

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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 Sessions 2024-25

Syllabus and Marking Scheme for Semester - I (2024-25)

Paper No.	Course Code/Title of the Paper	Marks Allotted in Theory		Marks Allotted in Internal Assessment		Credits
		Max.	Min.	Max.	Min.	
I	MZO 101/BIOSYSTEMATICS AND TAXONOMY	80	16	20	04	05
II	MZO 102/STRUCTURE AND FUNCTIONS IN INVERTEBRATE	80	16	20	04	05
III	MZO 103/ENDOCRINOLOGY	80	16	20	04	05
IV	MZO 104/CELL AND MOLECULAR BIOLOGY	80	16	20	04	05
	MZOL 01 Lab Course I BIOSYSTEMATICS, TAXONOMY & INVERTEBRATE	100	33			04
	MZOL 02 Lab Course II ENDOCRINOLOGY AND CELL & MOLECULAR BIOLOGY	100	33			04
	Total	520		80		28

04 Theory papers	-	320
04 Internal Assessment	-	80 (20 in each paper)
02 Practical	-	200
Total Marks	-	600
Credits	-	28

GOVT. V.Y.T. PG. AUTONOMOUS COLLEGE DURG
M. Sc. ZOOLOGY
Semester - I
SESSION 2024-2025
PAPER- I
Course Code - MZO 101
BIOSYSTEMATICS AND TAXONOMY

UNIT – I

Max. M. - 80

Min. M. - 16

- Definition & basic concept of biosystematics & taxonomy.
- History, Problems, aims and tasks in taxonomy.
- Taxonomy as a profession.
- Importance & application of biosystematics in biology.
- Chemotaxonomy.
- Cytotaxonomy.

UNIT – II

- Taxonomic attributes.
- Theories of biological classification (Essentialism, Nominalism, Empirism, Cladism and evolutionary classification).
- Species Concept - Typological, Nominalistic, Biological & evolutionary species concept, difficulties in application of biological species concept.
- Polytypic species.
- Speciation – Allopatric, sympatric & parapatric speciation, factors affecting speciation.

UNIT – III

- Taxonomic procedures.
- Taxonomic collection.
- Curing of animals & Process of Identification.
- Preservation of specimens.
- Taxonomic Keys - Types, merits & demerits.
- International code of Zoological Nomenclature (ICZN).
- Interpretation of rules of nomenclature.

UNIT – IV

- Hierarchy of categories.
- Bio-geographical zones of India.
- Origin and Types of biodiversity & ecotones.
- Threats of biodiversity.
- Biodiversity conservation practices (in-situ & ex-situ & gene banks).
- Molecular perspectives on conservation of biodiversity.
- Origin of reproductive Isolation (Prezygotic & Post zygotic mechanisms).

GOVT. V.Y.T. PG AUTONOMOUS COLLEGE DURG
M. Sc. ZOOLOGY
Semester - I
SESSION 2024-2025
PAPER- IV
Course Code – MZO 104
CELL AND MOLECULAR BIOLOGY

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

UNIT I

Fundamentals of molecular biology -

- Properties of cells.
- Types of cells.
- Evolution of Eukaryotic cells.

Ultra structure & function of cell organelles -

- **Mitochondria** – Biogenesis, Structure of mitochondrial membrane, cristae, Respiratory Chain complex, Energy conservation during Oxidative phosphorylation (ATP synthesis).
- **Ribosome** – Types, structure, biogenesis & functions.
- **Golgi body** – Ultra (EM) structure, fenestration, biogenesis & functions.
- **Endoplasmic reticulum** - structure & function

UNIT - II

Ultra structure and functions of cell organelles -

- **Lysosome** – structure, polymorphism in Lysosome, function.
- **Microbodies** - Microsome and Peroxisome.
- **Nucleus**: Structure and function
- **Structure of DNA & RNA**
- **Chromosomes** –Nucleosome model, Euchromatin & heterochromatin, Giant chromosomes (Polytene, Lampbrush etc.).
- **Microtubules** - Structure and function.

UNIT – III

- **Biomembranes** - Structure, Molecular composition and arrangement of bio-membranes.
- Function of Biomembranes
- **Patterns of transport** - Passive (Osmosis and Diffusion) and Active transport.
- **Membrane pumps**: Sodium potassium pump, Calcium-ATPase pump, ATP dependent proton pump.

UNIT – IV

- **Cell surface receptor:** - Membrane receptor for extracellular matrix.
- **Second messenger system-** c AMP as a second messenger, Lipid derived second messenger, Roll of Ca^{++} as second messenger.
- **Signal transduction** –Signaling through G protein coupled receptors, GTPase cycle, Protein kinase mechanism – cAMP activated Protein kinase mechanism,
- Electrical properties of cell and synaptic transmission.
- **Biology of cancer** –Oncogenes, tumor suppressor genes, cancer and cell cycle. Metastasis, interaction of cancer cells with normal cells, apoptosis and therapeutic interventions of uncontrolled cell growth.

SUGGESTED READING MATERIALS (ALL LATEST EDITION).

1. **MOLECULAR CELL BIOLOGY:** Lodish, W.H. Freeman & Co. NewYork.
2. **PRINCIPLES OF BIOCHEMISTRY:** Lehninger, Fourth Edition - David L. Nelson, Michael M. Cox.
3. **MOLECULAR CELL BIOLOGY:** Lodish M. Baltimore, Scientific American books.
4. **ESSENTIALS OF CELL & MOLECULAR BIOLOGY:** Roberties & Roberties, Halt Saunders International Edition.
5. **CELL & MOLECULAR CELL BIOLOGY:** Gerald Karp, Willey & Sons Co.
6. **MEDICAL CELL BIOLOGY:** Flickinger, E.J. Brown J.C. Halt Saunders International Edition.
7. **CELL BIOLOGY:** Powar C.B. Himalaya Publishing House.
8. **Cell Biology:** S.C. Rastogi, Wiley-Blackwell; 3rd edition (5 August 2011)

Course Outcomes

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

- To understand the key concepts of biology at physiological, biochemical, molecular and cellular level.
- To imparts knowledge about structural and functional organization of a typical prokaryotic and eukaryotic cell structures and evolution of eukaryotic cell.
- To understand about cell regulatory mechanisms and key concepts about signal transduction mechanisms.
- To identify link between genetics and cancer with emphasis on oncogenes, tumor suppressor genes, apoptosis, metastasis and relation of cell cycle to cancer.
- To acquire skills in teaching the structural and functional features of invertebrate life forms.


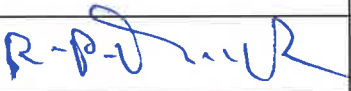
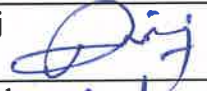
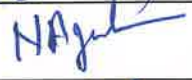






EVALUATION PATTERN

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The syllabus for Paper IVth (M. Sc. ZOOLOGY, Sem. - I) is hereby approved for the Session 2024 – 25

Name & Signature of Members of Board of Studies

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Subject Expert 	1. Dr. Divya K. Minj 
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M. Sc. ZOOLOGY
SEMESTER – I (2024 -25)
MZOL 01, LAB COURSE-I
(Syllabus & Scheme of Marks allotment in Practical examination)

1. Study of museum specimens from protozoa to minor phyla.
2. Study of permanent and histological slides of invertebrate (protozoa to minor phyla).
3. Collection, identification and preservation of animals.
4. Permanent slide preparation of preserved materials.
5. Alternative methods of dissection: prawn, earthworm, cockroach, snail. Leech and octopus, Sepia, Loligo and starfish.
6. Exercise from taxonomy (Taxonomical keys, index preparation).

SN.	Exercises	Marks
1.	Identification Of Fresh Water Invertebrates	05
2.	Identification Of Animals using Taxonomic Key	10
3.	Determination of Density, Frequency and Abundance of Species	10
4.	Slide Preparation	05
5.	Spotting	20
6.	Alternative Methods of Dissection	05
7.	Excursion For Collection of Animals	10
8.	Sessional	20
9.	Viva	15
	Total	100

Excursion tour can be organized to study local fauna as per syllabus at adjoining areas in Chhattisgarh.

Course Outcomes

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

- To understand the key concepts of fresh water invertebrates with their identification and conservation methods.
- To imparts knowledge about quantitative estimation of invertebrate organisms.
- To acquire skills in explaining the structural and functional features of invertebrate life forms.
- To recognize the importance of conservation of animals.

M. Sc. ZOOLOGY
SEMESTER – I (2024-25)
MZOL 02, LAB COURSE-II
(Syllabus & Scheme of Marks allotment in Practical Examination)

1. Study of permanent slides of various endocrine glands of vertebrates.
2. Histological studies of endocrine glands of vertebrates.
3. Preparation of Permanent slides of endocrine glands of fish.
4. Hormone based diagnostic study
5. Hormone assay.
6. Alternative methods of dissection of endocrine glands of vertebrate.
7. Cytological Studies:
 - Study of various stages of mitosis & meiosis cell division.
 - Study of giant chromosomes through slide preparation.
 - Slide preparation of mitochondria/ Barr body from oral smear and blood.
 - DNA Separation.








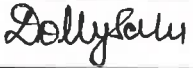

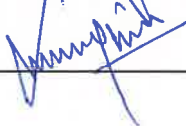
S. No.	EXERCISES	Marks
1.	SPOTTING	20
2.	Hormone Assay/ Permanent Slide Preparation	20
3.	Hormone Based Diagnostic Studies	
4.	Slide Preparation: Mitosis/ Meiosis Polytene Chromosome Barr body/Mitochondria	20
5.	Alternative Dissection Method	05
6.	Sessional	20
	Viva	15
	Total	100

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

- To understand the histological characteristics of various endocrine glands of vertebrates.
- To acquire skills in preparation of Permanent slides.
- To Hormone based diagnostic study
- To impart knowledge about hormone assay and alternative methods of dissection of vertebrates.
- To gain command on the cytological experiments.

The syllabus for lab. Course-I (M. Sc. ZOOLOGY, Sem. - I) is hereby approved for the session 2024 – 25

Name & Signature of Members of Board of Studies

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 - 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

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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**).
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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

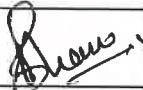


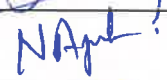

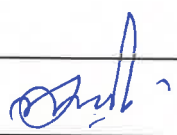


- Science Subjects with 04 theory papers (100 each) and one /two practical (100 each) – 20 + 08 = 28 credits
- Science Subjects with 05 theory papers (no practical-Maths) – 25 credits
- Arts Subjects with 04 theory papers – 20 credits
- Arts Subjects with 05 theory papers – 25 credits
- Commerce subject 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. - I) is hereby approved for the Sessions 2024 - 25

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 