List of New Course(s) Introduced

Department: Zoology

Programme Name : B.Sc.

Academic Year : 2024-25

List of New Course(s) Introduced

Sr. No.	Course Code	Name of the Course
01.	ZOUCMJT1	Diversity of chordates
02.	ZOUCMJT2	Cell biology
03.	ZOUCMNT1	Diversity of chordates
04.	ZOUCVOT1	Histological techniques and light microscopy
05.	ZOUCSET1	Sericulture
06.	AEC	Language (Hindi/English)
07.	ZOUDMJT1	Microbiology and Parasitology
08.	ZOUDMJT2	Fundamental Biochemistry
09.	ZOUDMJT3	Ecosystem dynamics and conservation/ Complex ecosystem dynamics (MOOCS)
10	ZOUDMNT1	Microbiology and Parasitology
11	ZOUCVOT1	Medical diagnostics
12	AEC	Language (Hindi/English)

HEAD
Department of Zoology
Guru Ghasidas Vishwavidyalaya, Bilaspur

Minutes of Meetings (MoM) of Board of Studies (BoS)

Academic Year : 2024-25

School : Life Sciences

Department : Zoology

Date and Time : 25/08/2023

Venue : Meeting room Zoology

DEPARTMENT OF ZOOLOGY

GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR (C.G.) - 495009

Minutes of the Meeting of the Board of Studies (Zoology) held on 25.08.2023

A meeting of Board of Studies (Zoology) was held on 25.08.2023. Following matters were resolved in the meeting.

As per UGC guidelines and ordinance 97 of the Guru Ghasidas Vishwavidyalaya, four year degree program curriculum based on NEP 2020 was designed and approved. The courses introduced in this curriculum are all new and introduced first time as follows:

- Major courses (Core courses) will be offered to the students of Zoology department.
- Multidisciplinary courses, Minor course, AEC, SEC, Vocational and Value added courses were given to the pool of the university to offer to the students based on their choice.
- Vocational courses introduced in this curriculum will be offered to the students upon exiting the course after 2nd semester or 4th semester. For rest of the students theses courses will be offered as an internship after 5th semester.

Following members were present in the meeting:

			Signature
1.	Prof. LVKS Bhaskar	Chairman, BOS	25/8/2023
2.	Prof. Poonam Sharma	Member (External)	25/08/2023
3.	Dr. Hasansab Nadaf	Member (Industry Expert)	25/08/2023
4.	Prof. Seema Rai	Member	25/8/23
5.	Prof. Monika Bhadauria	Member	26/8/23
6.	Dr. Rohit Seth	Member (on leave)	
7.	Dr. Santosh Singh	Member	26/8/23

Scheme and Syllabus

SCHEME AND SYLLABUS

FOR

- **UG Certificate in Zoology: 1 year**
- **UG Diploma in Zoology: 2 years**
- **UG Degree in Zoology: 3 years**
- **UG (honours with research) in Zoology: 04 years**
- **UG (honours) in Zoology: 04 years**

Under

National Education Policy 2020

Department of Zoology, School Of Life Sciences
Guru Ghasidas Vishwavidyalaya, Bilaspur (CG)

2023-2024

Scheme and Syllabus for UG Courses in Zoology

Department of Zoology, School of Studies of Life Sciences,
Guru Ghasidas Vishwavidyalaya, Bilaspur

Semester	Courses	Name of courses	Code	Number of courses	Level	Credits	Total Credits
I	Major	**Animal Diversity of Non chordates (Protista to Pseudocoelomate)**	ZOUAMJT1	1	2	3	18
		Lab Course	ZOUAMJL1			1	
	Minor	**Minor 1** To be offered to the students of other departments	ZOUAMNT1	1	2	3	
		Lab Course	ZOUAMNL1			1	
	Multidisciplinary	**Multidisciplinary 1** To be offered to the students of other disciplines (except Natural and Physical Sciences)	ZOUAMDT1	1	1	3	
	SEC	**SEC 1** To be offered to students of Zoology/other departments at University level	ZOUASET1	1	1	2	
		Lab Course	ZOUASEL1			1	
	VAC	**VAC 1** To be offered tothe students of Zoology/other departments at University level	ZOUAVAT1	2	1	2	
	AEC	**Language** To be offered by Hindi/English Department for student of Zoology		1	1	2	
II	Major	**Animal Diversity of Non chordates (Coelomates)**	ZOUBMJT1	1	2	3	18
		Lab Course	ZOUBMJL1			1	
	Minor	**Minor 2** To be offered to the students of other departments	ZOUBMNT1	1	2	3	
		Lab Course	ZOUBMNL1			1	
	Vocational	**Vocational 1** To be offered to the students of Zoology/other departments at University level	ZOUBVOT1			1	
		Ornamental Fish Culture Lab Course	ZOUBVOL1			3	
	Multidisciplinary	**Multidisciplinary 2** To be offered to the students of other disciplines (except Natural and Physical Sciences)	ZOUBMDT1	1	1	3	
	SEC	**SEC 2** To be offered to the students of Zoology/other departments at University level	ZOUBSET1	1	1	2	
		Lab Course	ZOUBSEL1			1	
	VAC	**VAC 2** To be offered to the students of Zoology/other departments at University level	ZOUBVAT1	2	1	2	
	AEC	**Language** To be offered by Hindi/English Department for student of Zoology		1	1	2	
The student must complete the 4 credits vocational course/Internship during summer term to get UG Certificate if he wishes to exit the program after first 2 semesters.							

14/02/2025 14/02/2025 14/2/2025

New Course Introduced

III	Major	**Diversity of Chordates**	ZOUCMJT1	2	3	3	20
		Lab Course	ZOUCMJL1			1	
		Cell biology	ZOUCMJT2			3	
		Lab Course	ZOUCMJL2			1	
	Minor / Vocational	**Minor3** To be offered to the students of other departments	ZOUCMNT1	1	3	3	
		Lab Course	ZOUCMNL1			1	
		Vocational 2 To be offered to the student of Zoology/other departments at University level	ZOUCVOT1			1	
		Histological Techniques and Light Microscopy-Lab Course	ZOUCVOL1			3	
	Multidisciplinary	**Multidisciplinary 2** To be offered to the students of other disciplines (except Natural and Physical Sciences)		1	1	3	
	SEC	**SEC 3** To be offered to the students of Zoology/other departments at University level	ZOUCSET1	1	1	2	
		Lab Course	ZOUCSEL1			1	
	AEC	**Language** To be offered by Hindi/English Department for student of Zoology		1	1	2	
IV	Major	**Microbiology and Parasitology**	ZOUDMJT1	3	3	3	20
		Lab Course	ZOUDMJL1			1	
		Fundamental Biochemistry	ZOUDMJT2			3	
		Lab Course	ZOUDMJL2			2	
		Ecosystem Dynamics and Conservation / Complex ecosystem Dynamics (MOOCS)	ZOUDMJT3			3	
		Lab Course	ZOUDMJL3			2	
	Minor / Vocational	**Minor 4** To be offered to the students of other departments	ZOUDMNT1	1	3	2	
		Lab Course	ZOUDMNL1			3	
		Vocational 3 To be offered to the students of Zoology/other departments at University level	ZOUDVOT1			1	
		Medical diagnostics Lab Course	ZOUDVOL1			3	
	AEC	**Language** To be offered by Hindi/English Department for student of Zoology		1	1	2	

...tional course/Internship either after first year or second year

Major Courses: ZOUCMJT2 and ZOUCMJL2

Semester	Major Course	Course Title	Credits
III	4	Cell Biology	Theory: 03 Practical: 01

About the course

The course provides a detailed insight into basic concepts of cellular structure and function. It also gives an account of the complex regulatory mechanisms that control cell function.

Course outcomes

After successfully completing this course, the students will be able to

1. Understand the functioning of nucleus and extra nuclear organelles
2. Understand the intricate cellular mechanisms involved.
3. Acquire the detailed knowledge of different pathways related to cell signaling and apoptosis thus enabling them to understand the anomalies in cancer.
4. Develop an understanding how cells work in healthy and diseased states and to give a 'health forecast' by analyzing the genetic database and cell information.
5. Understand how tissues are produced from cells in a normal course and about any malfunctioning which may lead to benign or malignant tumor.

Course Outcomes and their mapping with Programme Outcomes

COs	POs						PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CO1	3	3	3	1	3	3	3	1	1
CO2	3	3	3	1	3	3	3	1	1
CO3	3	3	3	1	3	3	3	1	1
CO4	3	3	3	1	3	3	3	-	1
CO5	3	3	3	1	3	3	3	-	1

Weightage: 1- Slightly; 2- Moderately; 3- Strongly

Theory

Unit 1: Overview of Cells and plasma membrane **15 Lectures**

Prokaryotic and Eukaryotic cells, Cell Theory, Virus, Viroids, Prions. Various models of plasma membrane. Structure and Function of Plasma Membrane. Transport across membranes: Active and Passive transport, Facilitated transport; Cell junctions: Tight junctions, Gap junctions.

Unit 2: Cellular Organelles andEndomembraneSystem **12 Lectures**

Structure and Functions: Endoplasmic Reticulum, Golgi Apparatus, Lysosomes, Peroxisomes, Mitochondria: Structure, Semi-autonomous nature, Endosymbiotic hypothesis, Mitochondrial Respiratory Chain, Chemi-osmotic hypothesis.

Unit3: Cytoskeleton **08 Lectures**

Structure and Functions: Microtubules, Microfilaments and Intermediate filaments.

Unit4: Nucleus **10 Lectures**

Structure of and function of Nucleus. Chromatin: Euchromatin and Hetrochromatin and packaging (nucleosome). Giant Chromosomes: Polytene and Lampbrush. Structure and types of DNA and RNA.

Unit 5: Cell division and Signaling **12 Lectures**

Cell cycle, cell division- mitosis and meiosis. Cell division check points and their regulation. Role of growth factors. Mutations in the genes that regulate cell cycle and division and their role in causing cancer. Programmed cell death (Apoptosis). Cell regulation and Cell signaling: Signaling molecules and their receptors. Functions of cell surface receptors.

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Major Courses: ZOUDMJT2 and ZOUDMJL2

Semester	Major Course	Course Title	Credits
IV	6	Fundamental Biochemistry	Theory: 03 Practical: 02

About the course

Course is aimed to provide molecular structure of biological macromolecules (Carbohydrates, protein, and lipids) and their significance in living system. How enzymes work to perform biochemical reaction during metabolism.

Course Outcomes

To analyses and understand the basic concept of chemical reaction occur in living system that enables them to explore the applied science beneficial for mankind.

1. Understand about the importance and scope of biochemistry.
2. Understand the structure and biological significance of carbohydrates, proteins andlipids.
3. Understand the concept of enzyme, its mechanism of action and regulation.
4. Learn biochemical tests for amino acids, carbohydrates, proteins and nucleic acids.
5. Learn measurement of enzyme activity and its kinetics.

Course Outcomes and their mapping with Programme Outcomes

COs	POs						PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CO1	3	3	3	1	3	3	3	1	1
CO2	3	3	3	1	3	3	3	1	1
CO3	3	3	3	1	3	3	3	1	1
CO4	3	3	3	1	3	3	3	-	1
CO5	3	3	3	1	3	3	3	-	1

Weightage: 1- Slightly; 2- Moderately; 3- Strongly

Theory

Unit 1: Biomolecules **04 Lectures**

Chemistry of Living system: Scope and importance; Biomolecules: Organizational principle, Configuration and confirmation; Water as a biological solvent.

Unit 2: Carbohydrates **10 Lectures**

Structure and Biological importance of carbohydrates. Aldose, ketose, chiral centre, polarized light and Fischer's nomenclature, cyclization reaction of glucose, anomers, pyranose, furanose, glycosidic linkage, reducing and non-reducing sugars.Sequence of reactions and regulation of glycolysis, Citric acid cycle, Pentose Phosphate pathway, Gluconeogenesis, Glycogenolysis and Glycogenesis.

Unit 3: Lipids **08 Lectures**

Structure and Significance: saturated and unsaturated fatty acids, Tri-acylglycerols, Phospholipids, Glycolipids, Steroids.β-oxidation and omega -oxidation of saturated fatty acids with even and odd number of carbon atoms; Biosynthesis of palmitic acid; Ketogenesis.

Unit 4: Proteins **14 Lectures**

Proteins: Bonds stabilizing protein structure; Denaturation; Simple and conjugate proteins.

Amino acids: Structure, Classification and properties of α-amino acids; essential and non-essential α-amino acids. Catabolism of amino acids: Transamination, Deamination, Urea cycle; Fate of C- skeleton of Glucogenic and Ketogenic amino acids.

Unit 5: Enzymes **14 Lectures**

Nomenclature and classification; Cofactors; Specificity of enzyme action; Mechanism of enzyme action; Enzyme kinetics; Factors affecting rate of enzyme-catalyzed reactions; Derivation of Michaelis-Menten equation, Concept of Km and Vmax, Lineweaver-Burk plot; Enzyme inhibition; Allosteric enzymes and their kinetics; Regulation of enzyme action.

14/02/2025 14/02/25 14/02/2025

Major Courses: ZOUDMJT3 and ZOUDMJL3

Semester	Major Course	Course Title	Credits
IV	7	Ecosystem Dynamics and Conservation	Theory: 03 Practical: 02

About the course

This course will take students on a journey through the physical workings of the Earth, the interactions between species and their environments. The course highlights on some of the important aspects viz. growth and survival of populations and communities in different habitats, energy flow in the ecosystems, interactions between the communities, exclusion of niches and consequences of changing environment on the biodiversity.

Course outcomes

After successfully completing this course, the students will be able to:

1. Develop knowledge base covering all attributes of the environment and ecology.
2. Illustrate the flow of energy through ecosystems with reference to tropic levels and ecological efficiency.
3. Describe population structures and growth.
4. To develop an appreciation of the modern scope of the scientific study in the field of ecology.
5. Solve the environmental problems involving interaction of humans and natural systems at local or global level.To study about basic methods of wildlife conservation

Course Outcomes and their mapping with Programme Outcomes

COs	POs						PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CO1	3	3	3	1	3	3	3	1	1
CO2	3	3	3	1	3	3	3	1	1
CO3	3	3	3	1	3	3	3	1	1
CO4	3	3	3	1	3	3	3		1
CO5	3	3	3	1	3	3	3		1

Weightage: 1- Slightly; 2- Moderately; 3- Strongly

Theory

Unit 1: Introductionto Ecology **03 Lectures**

History of ecology; Autecology and synecology; Levels of organization; Laws of limiting factors-Liebig's law of minimum and Shelford's law of tolerance; Study of physical factors-Temperature and Light.

Unit2:Ecosystem **12 Lectures**

Types of ecosystems: Trophic levels; Food chain: Detritus and grazing food chains, Linear and Y-shaped food chains; Food web; Energy flow through ecosystem; Ecological pyramids and Ecological efficiencies;Ecological features of Tundra, Desert, Savannah and Tropical Rain forest Biomes;Human modified ecosystem. Nutrient and biogeochemical cycle (C, N, P & S).

Unit3:Population **12 Lectures**

Unique and group attributes of population: Density, natality, mortality, life tables, fecundity tables, survivorship curves, age and sex ratio, dispersal and dispersion, Exponential and logistic growth, equation and patterns, r and k strategies; Popsalation regulation-density-dependent and independent factors; Population interactions.

Unit4: Community **07 Lectures**

Community characteristics: species richness, dominance, diversity, abundance, vertical stratification, Ecotone and edge effect; Ecological Succession, Types of Succession, Theories pertaining to climaxcommunity.

Unit 5: Human impact on environment **06 Lectures**

Environmental Pollution: Air, water and noise pollution; Greenhouse effect, Acid rain, Global Warming, Ozone depletion.Ecology in Wildlife Conservation and Management, Biodiversity; types, importance and threats. Protected areas; National parks, Bio reserves and Sanctuaries. Restoration ecology.

Skill Enhancement Course (SEC): ZOUCSET1 and ZOUCSEL1

Semester	SEC	Course Title	Credits
III	SEC-3	Sericulture	Theory: 02 Practical: 01

About the course

The course gives insight into the principles of sustainable sericulture and how these principles can guide your silkmoth rearing into an enduring practice. The students will know about the laws and by laws governing keeping silkmoth.

Course Outcomes

1. To know about importance of sericulture in the rural development and various species of silk moth.
2. To know biology of silkmoths and technologies used in sericulture.
3. To know about the pests and diseases of silkmoths and their control.
4. To know about the Institutions promoting sericulture in rural areas.

Course Outcomes and their mapping with Programme Outcomes

COs	POs						PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CO1	3	3	3	1	3	3	3	1	1
CO2	3	3	3	1	3	3	3	1	1
CO3	3	3	3	1	3	3	3	1	1
CO4	3	3	3	1	3	3	3		1

Weightage: 1- SEightly; 2- Moderately; 3- Strongly

Theory

Unit 1: Silkworm distribution and races **08 Lecture**

The silkworms: Definition, history and present status of sericulture. World silk production and silk road. Distribution and types of races. Morphological characteristics. Mulberry and non-mulberry sericulture. Sericultural practices in tropical and temperate climate.

Unit 2: Biology of silkworm and technologies used in sericulture **08 Lecture**

Biology of silkworm: Life cycle of *Bombyx mori*. Structure of silk gland and Secretion of silk. Selection of mulberry variety. Propagation and establishment of mulberry garden, Rearing house and rearing appliances. Silkworm rearing technology: Early age and Late age rearing. Mounting. Spinning. Quality and storage of cocoons. Stifling. Reeling.

Unit 3: Diseases of silk worm and prevention and control **09 Lecture**

Diseases and Enemies of silkworm: Uzi fly, dermestid beetles and vertebrates. Protozoan, viral, fungal and bacterial diseases. Control and prevention of pests and diseases. Disinfectants: Formalin, bleaching powder RKO.

Unit 4: Prospects of Sericulture in India **10 Lecture**

Prospects of Sericulture in India. Silk industry in different states. Employment generation in sericulture. Role of women in sericulture. Sericulture organization in India; Role of state departments of Sericulture, Central Silk Board, Universities and NGOs in Sericulture development.

Vocational Courses: ZOUCVOT1 and ZOUCVOL1

Semester	Vocational Course	Course Title	Credits
III	VOC-2	Histological Techniques and Light Microscopy	Tutorial: 01 Practical: 03

About the course

This is the laboratory based course. It has full hands on approach to expose the students to learn techniques and methodologies for histo-pathological features. The course provides a detailed insight into basic concepts of cellular structure and function as well as tissue organization.

Learning outcomes

After successfully completing this course, the students will be able to

- Understand how tissues are preserved using fixatives.
- Understand the functioning of microtome for scanning of tissue samples.
- Acquire the detailed knowledge of different histochemical techniques related tocell components.
- Acquire brief knowlalge different staining method for enzymatic studied.
- Develop an understanding how cells work in healthy and diseased states
- Develop skill on working of light microscope to differentiate healthy and diseased states of tissues.

Course Outcomes and their mapping with Programme Outcomes

COs	POs						PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CO1	3	3	3	1	3	3	3	1	1
CO2	3	3	3	1	3	3	3	1	1
CO3	3	3	3	1	3	3	3	1	1
CO4	3	3	3	1	3	3	3	1	1
CO5	3	3	3	1	3	3	3	1	1

Weightage: 1- Slightly; 2- Moderately; 3- Strongly

Theory

Unit 1: Fixation and tissue processing

Types of fixatives, Chemistry of fixation, Choice of fixatives, Dehydration, Clearing and embedding. Microtomy: Types of microtome, Sectioning of paraffin blocks.

Unit 2: Principle and methods of staining

Dyes and stains, Mordents, Histological stains: haematoxylin and eosin. Principles and methods of histochemical localization:

Unit 3: Staining methods for major cell components

Glycogen and glycoproteins by periodic acid Schiff's method, Glycoproteins by alcian blue methods, General lipids by Sudan black B method Neutral lipids by Sudan III and Sudan IV methods.

Unit 4: Advanced staining methods for nucleic acids and enzymes

Methyl green pyronin-Y for DNA and RNA, Feulgen reaction for DNA. Protein end groups: General protein localization by bromophenol blue method; $-NH_2$ groups by Ninhydrin-Schiff method. Detection of enzyme activity: Acid / alkaline phosphatases.

Unit 5: Microscopy:

Basic principle, Types of microscope and their biological applications, Bright-field microscope: numerical aperture, limit of resolution, types of objectives, ocular and stage micrometers, Transmission and scanning electron microscope.

Vocational Courses: ZOUDVOT1 and ZOUDVOL1

Semester	Vocational Course	Course Title	Credits
IV	VOC-3	Medical Diagnostics	Tutorial: 01 Practical: 03

Course Outcomes

This paper is focused to provide students an opportunity to study how clinicians come to a conclusion regarding disease prediction, prevention, diagnosis, and optimal treatment regimens. Students will learn about multiple diagnostic tools, techniques and technologies used in medical practices. The emphasis is on, how to select an appropriate diagnostic technique, methods and technologies to conduct analyses to understand the results and their implications in patients' diagnosis. This paper mainly focuses on clinical chemistry, hematology, diagnostic microbiology, histopathology, molecular diagnostics and diagnostic medical imaging.

Learning outcomes

1. Gain knowledge about diagnosis of various infectious, non-infectious and lifestyle diseases.
2. Understand the use of histology and biochemistry of clinical diagnostics.
3. Develop their skills in various types of tests and staining procedure involved in hematology.
4. Learn scientific approaches/techniques used in the clinical laboratories to investigate various diseases and will be skilled to work in research laboratories.
5. Acquire knowledge about common imaging technologies and their utility in the clinic to diagnose a specific disease.

COs	POs						PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CO1	3	3	3	1	2	-	3	2	1
CO2	3	3	3	1	1	-	3	2	1
CO3	3	3	2	-	1	-	3	2	-
CO4	3	2	2	-	-	-	3	1	-
CO5	3	2	1	-	-	-	3	1	-

Unit 1: Introduction to medical diagnostics and its importance **5 Lectures**

Identification of common equipment, principle and care of laboratory instruments. Basic needs of clinical laboratory technician, awareness of soft skills. NABL and SOP. Basic causes Personnel care and protection

Unit 2: Maintenance & equipment of pathology lab **5 Lectures**

Materials, Equipment & Techniques. Reagents – Preparation and their uses. Personnel care and protection Disposal of Bio-Medical waste. Sample Collection, Preservation & Labeling of Slides, Blocks, Specimens. Clinical Samples Fixatives. Preservation of reports & records.

Unit 3: Collection of specimen and disposal of waste **5 Lectures**

General principles, containers, rejection. Samples-Urine, Faeces, Sputum, Pus, Body Fluids, Swab, Blood. Importance of biomedical waste. Disposal of laboratory/hospital waste. Non-infectious waste, infected sharp waste disposal, infected non-sharp waste disposal.

Unit 4: Basic haematological techniques **5 Lectures**

Basic steps for drawing blood by vein, capillary and artery puncture. Complications during and after blood collection. Specimen rejection criteria for blood. Anticoagulants types and concentration. Transport of blood sample. Blood composition, Preparation of blood smear and blood cell counting.

Unit 5: Diagnostic methods used for urine analysis **5 Lectures**

Urine analysis: Urine collection, preservation. Physical examination of urine, Abnormal constituents, Urine culture. Urinary tract infection, kidney disease and diabetes. Urine analysis for Chemicals, Sugar, Ketone Bodies, Bile, Blood, Crystals.