List of Courses which focuses on Professional Ethics, Gender, Human Values, Environment & Sustainability and other value framework

Department : *Zoology*

Programme Name : *B. Sc.*

Academic Year : 2024-25

Courses which focuses on Professional Ethics, Gender, Human Values, Environment & Sustainability and other value framework:

Sr. No.	Course Code	Name of the Course
01.	ZOUAVAT1	Bhartiya Vigyan ka Itihas
02.	ZOUASET1	Aquaculture
03.	ZOUBVAT1	Food Nutrition and Health
04.	ZOUBVOT1	Ornamental Fish Culture
05.	ZOUDMJT3	Ecosystem Dynamics and Ecosystem
06.	ZOUDVOT1	Medical Diagnostics

HEAD
Department of Zoology

Scheme and Syllabus

SCHEME AND SYLLABUS

FOR

- **UG Certificate in Zoology: 1 year**
- **UG Diploma in Zoology: 2 years**
- **UGDegree 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)

2024-25

14/02/2025 14/02/2025

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.							

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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			1	
	AEC	**Language** To be offered by Hindi/English Department for student of Zoology		1	1	3	
	The student must complete the 4credits vocational course/Internship either after first year or second year during summer term to get UG Diploma if he wishes to exit the program after first 4 semesters.					2	
V	Major	**Physiology of Basic Life Process**	ZOUEMJT1	3	4	3	21
		Lab Course	ZOUEMJL1			2	
		Bioinstrumentation	ZOUEMJT2			3	
		Lab Course	ZOUEMJL2			2	
		Principle of Genetics and Evolution	ZOUEMJT3			3	
		Lab Course	ZOUEMJL3			2	
	Minor	**Minor 5** (To be offered to the students of other departments)	ZOUEMNT1	1	4	3	
		Lab Course	ZOUEMNL1			1	

As per NEP-2020, Department of Zoology will offer minor courses, multidisciplinary courses (MDC), ability enhancement courses (AEC), skill enhancement courses (SEC), value added courses (VAC) and vocational courses (VOC) to students of other departments.
Similarly, student of Department of Zoology will study these courses from the coursed offeredl by other departments/ as per University decision.
Pool for minor course, multidisciplinary course, AEC, SEC, VAC and vocational course will be given by University.
Two AEC courses are compulsory in first 2 semesters (One in each semester).
Three SEC courses are compulsory in first 3 semesters (One in each semester).
Three Multidisciplinary courses are compulsory in first 3 semesters (One in each semester).
Four VAC courses are compulsory in first 2 semesters (Two in each semester).
One vocational course for certificate and diploma courses, three vocational courses for 3/ 4 year degree are compulsory.
List of minor courses, multidisciplinary courses, AEC, SEC, VAC and vocational courses offered by the department of zoology (in University pool) is as follows:

Minor Courses

S. N.	Title	Course Name
1.	Minor 1	Animal Diversity of Non chordates (Protista to Pseudocoelomate)
2.	Minor 2	Animal Diversity of Non chordates (Coelomates)
3.	Minor 3	Diversity of Chordates
4.	Minor 4	Microbiology and Parasitology
5.	Minor 5	Physiology of Basic Life Processes
6.	Minor 6	Physiology of Regulatory Life Process
7.	Minor 7	Immunology
8.	Minor 8	Research Methodology and Biostatistics
9.	Minor 9	Applied Zoology

Multidisciplinary Courses

S. N.	Title	Course Name
1.	Multidisciplinary 1	Introductory Zoology
2.	Multidisciplinary 2	Essentials of Zoology

Skill Enhancement Courses

S. N.	Title	Course Name
1.	SEC 1	Aquaculture
2.	SEC 2	Apiculture
3.	SEC 3	Sericulture

Value Added Courses

S. N.	Title	Course Name
1.	VAC 1	Bhartiya Vigyan Ka Itihas
2.	VAC 2	Food Nutrition and Health (Health & wellness)

Vocational Courses

S. N.	Title	Course Name
1.	VOC 1	Ornamental Fish Culture
2.	VOC 2	Histological Techniques and Light Microscopy
3.	VOC 3	Medical Diagnostics

Department may offer at least one paper in whole UG program on MOOC's platform and it will be compulsory to all students.
Summer and/or winter internship: duration will be 2-4 weeks (minimum 90 working hours).

Abbreviations:
AEC= Ability enhancement course; SEC= Skill enhancement course; VAC= Value added course
(Subject to approval by the competent authority)

Value Added Courses: ZOUAVAT1

Semester	VAC	Course Title	Credits
I	VAC-1	Bhartiya Vigyan Ka Itihas	Theory: 02

About the course

The course provides an insight into the status of science in ancient India, its gradual development, innovations and the pioneers in the field of science, reputed research institutions in India and cutting edge research in science.

Course outcomes

1. The students will feel pride to know the pioneer role of Indians in the development of astronomy, mathematics, engineering and medicine in the World history.
2. Develop understanding of various branches of science during different eras and analyze the role played by different Indian organizations in science.
3. Appraise the contribution of different Indian Scientists.
4. Students will be aware about the modern development of animals, agriculture and biological sciences in republic India.

Course Outcomes and their mapping with Programme Outcomes

CO	PO						PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CO1	2	3	2	3	3	2	1	3	2
CO2	3	3	2	3	2	2	2	3	3
CO3	3	2	2	2	2	1	2	3	2
CO4	3	2	1	2	1	2	2	2	1
CO5	-	-	-	-	-	-	-	-	-

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

Theory

UnitI: Science in ancient and medieval India **10 Lecture**

History of development in astronomy, mathematics, engineering and medicine subjects in Ancient India, Influence of the Islamic world and Europe on developments in the fields of mathematics, chemistry, astronomy and medicine.

Unit 2: Prominent Indian scientists **12Lecture**

Eminent scholars in mathematics and astronomy: Baudhayana, Aryabhatta, Brahmgupta, Bhaskaracharya, Varahamihira, and Nagarjuna, Medical science of Ancient India (Ayurveda and Yoga): Susruta, Charak. Scientists of Modern India: Srinivas Ramanujan, C.V. Raman, Jagdish Chandra Bose, Homi Jehangir Bhabha,Vikram Sarabhai etc.

Unit III: Indian science in before and after Independence **13 Lecture**

Introduction of different surveyors, zoologists and doctors as early scientist in Colonial India, Indian perception and adoption for new scientific knowledge in Modern India. Establishment of premier research organizations like CSIR, DRDO and ICAR and ICMR, IIT's, Establishment of Atomic Energy Commission, Launching of the space satellites, ISRO's accomplishments. Zoological survey of India.

Recommended readings

1. Kuppuram, G. (1990) History of Science and Technology in India, South Asia Books.
2. Handa, O.C. (2014) Reflections on the history of Indian Science and Technology, Pentagon Press.
3. Basu, A. (2006) Chemical Science in Colonial India: The Science in Social History, K.P. Bagchi & Co.
4. Habib, I. (2016) A people's history of India 20: Technology in Medieval India, 5th Edition, Tulika Books.
5. Rahman, A. et al (1982) Science and Technology in Medieval India – A Bibliography of Source Materials in Sanskrit, Arabic and Persian, New Delhi: Indian National Science Academy.

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Skill Enhancement Course (SEC): ZOUASET1 and ZOUASEL1

Semester	SEC	Course Title	Credits
I	SEC-1	Aquaculture	Theory: 02 Practical: 01

About the course

This course will give the students an understanding of the principles of aquaculture, including production systems, water quality, nutrition, spawning, larval culture and culture methodologies with special reference to fish, and prawn. The course will include an opportunity to conduct hands-on activities related to culture and husbandry of animals

Course outcomes

After completing this course the learners will be able to

1. Understand the aquaculture systems
2. Understand pond management to increase fish production
3. Understand fish breeding and health management
4. Understand the environmental impacts on aquaculture

Course Outcomes and their mapping with Programme Outcomes

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

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

Theory

Unit 1: Freshwater aquaculture systems **08 Lecture**

Aquaculture concept, Culture systems: Freshwater prawn culture, fish culture in paddy fields, Culture of Catfishes. Composite fish culture: Techniques of composite culture. Composite fish farming in India. Mariculture: Brackish water prawn culture. Mussel culture. Culture of aquatic weeds.

Unit 2: Preparation and management of fish culture ponds **08 Lecture**

Fish culture ponds. Pond management: Fish toxicants. Predatory and Weed fishes and their control. Aquatic insects and their control. Fish manures. Water quality. Culture: Pond culture. Monoculture. Monosex culture. Supplementary feeding. Harvesting: Fishing techniques, preservation & processing of fish.

Unit 3: Fish breeding, Transportation and Pathology **09 Lecture**

Fish breeding: Natural and artificial. Fish transportation: Methods for packaging and transport of fish.Transport of fish seed and Brood fish. Causes of mortality in transport. Use of chemicals in live fish transport: Anesthetic drugs. Antiseptics and Antibiotics. Fish diseases: Bacterial, fungal, protozoan and helminthes diseases. Non parasitic diseases.

Unit 4: Technologies in Fisheries development **10 Lecture**

Pearl culture: Introduction, Pearl producing mollusks, pearl formation, collection of oysters, Rearing of oysters, insertion of nucleus, harvesting of pearls, composition & quality of pearl. Recirculation technology. Geographic Information System (GIS) technology. Passive Acoustics in fisheries, Use of Information Communication Technology (ICT) in fishes: production aspects, marketing aspects.

Practical

1. Estimation of dissolved oxygen
2. Determination of pH of water samples
3. Measuring turbidity using a secchi disk
4. Measuring salinity of water
5. Total alkalinity measurement in natural waters
6. Phytoplankton analysis
7. Measurement of productivity
8. Study of major carps
9. Study of prawn species
10. Study of pearl oysters

Suggested readings

1. Jingran, V. G. (1983) Fish and fisheries of India, Hindustan pub. corp. New Delhi.
2. Hute, M. and Kahn, H. (2000) Textbook of fish culture, Blackwell Scientific Publication, Australia.
3. Srinivasulu, M., Reddy, K.R.S., Rao, S. (1999) Text book of Aquaculture, Discovery Publishing House New Delhi.
4. Yawn Mehta, Fisheries & Aquaculture Biotechnology (2011) Campus Books International, Prahalad street, Ansari Road, Durga Ganj, New Delhi.

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Value Added Courses: ZOUBVAT1

Semester	VAC	Course Title	Credits
II	VAC-II	Food, Nutrition and Health (Health & Wellness)	Theory: 02

About the course

The course covers the basic concepts of balanced diet for people of different ages besides focusing on the consequences of malnutrition and the deficiency diseases and the diseases caused due to poor hygiene.

Course outcomes

1. Imparting the basic concept of food and nutrition including the concept of a balanced diet, nutrient needs, and dietary patterns for various groups.
2. Understanding the biochemistry of major food components and the effects of their deficiency on health and evaluating the effectiveness of nutrition interventions when dealing with certainhealth problems.
3. Understanding the importance of lifestyle-related diseases, their causes, and prevention through dietary and lifestyle modifications.
4. Understand the importance of food and water safety and methods associated with the preservation of food and purification of contaminated water and make students aware of food, nutrition, and health needs.

Course Outcomes and their mapping with Programme Outcomes

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

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

Theory

Unit 1: Nutrition and dietary nutrients **08 Lectures**

Basic concept of Food: Components and nutrients. Concept of balanced diet, nutrient requirements and dietary pattern for different groups viz., adults, pregnant and nursing mothers, infants, school children, adolescents and elderly people.

Unit 2: Macro nutrients and micronutrients **09 Lectures**

Nutritional Biochemistry: Macronutrients: Carbohydrates, Lipids, Proteins- Definition, Classification, their dietary source and role. Micronutrients. Vitamins- Water-soluble and Fat-soluble vitamins- their sources and importance. Important minerals viz., Iron, Calcium, Phosphorus, Iodine, Selenium and Zinc: their biological functions.

Unit 3: Malnutrition and nutrient deficiency diseases **10 Lectures**

Definition and concept of health: Common nutritional deficiency diseases- Protein Malnutrition (e.g., Kwashiorkor and Marasmus), Vitamin A deficiency, Iron deficiency and Iodine deficiency disorders- their symptoms, treatment, prevention and government initiatives, if any. Life style dependent diseases- hypertension, diabetes mellitus, and obesity- their causes and prevention. Social health problems- smoking, alcoholism, narcotics. Acquired Immuno Deficiency Syndrome (AIDS): causes, treatment and prevention. Other ailments viz., cold, cough, and fever, their causes and treatment.

Unit 4: Diseases caused by microorganisms **10 Lectures**

Food hygiene: Potable water- sources and methods of purification at domestic level. Food and Water-borne infections: Bacterial diseases: cholera, dysentery; typhoid fever, viral diseases: Hepatitis, Poliomyelitis etc., Protozoan diseases: amoebiasis, giardiasis; Parasitic diseases: taeniasis and ascariasis their transmission, causative agent, sources of infection, symptoms and prevention. Causes of food spoilage and its prevention.

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Vocational Courses: ZOUBVOT1 and ZOUBVOL1

Semester	Vocational Course	Course Title	Credits
II	VOC-I	Ornamental Fish Culture	Tutorial: 01 Practical: 03

About the course

To make the students aware of the vast potentials involved in ornamental fish farming and trading besides making them learn the diseases in fishes and other constraints in their culturing.

Learning outcomes

After completing this course the learners will be able to:

1. To learn the scientific method of setting an aquarium.
2. To learn the culture breeding and marketing techniques of common indigenous ornamental fishes.
3. To learn about feeding mechanism for ornamental fishes.
4. To learn about pathology of ornamental fishes.

Course Outcomes and their mapping with Programme Outcomes

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

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

Tutorial + Practical

Unit 1: Designing and preparation of aquaria with all accessories **13 Lectures**

Design and construction of aquaria: aquarium fabrication- shape, size, volume, type of glass tank, preparation of glass tank; aquarium floor setting – type and size of pebbles, gravels, granites used for bed setting and its advantages. Filters- biological, chemical and mechanical. Aquarium accessories like aerators, decorative, lighting, heating and feeding trays. Water quality management in aquarium systems – sources of water, containers, storage, temperature, pH, dissolved carbon dioxide, ammonia, hardness, turbidity in aquarium. Aquarium plants: Uses of aquarium plants, different varieties of plants.

Unit 2: Common fresh water ornamental fishes **12 Lectures**

Fresh water ornamental fishes: Common ornamental fishes- indigenous and exotic species; Identification and biology of the common ornamental fishes. *Cyprinus carpio* (koi carp), *Molliensias phenops* (black molly lyre tail), *Poecilia reticulata* (guppy), *Poecilia latipinna*, *Xiphophorus helleri* (red sword tail) *Xiphophorous maculates* (red platy) *Pterophyllum scalarealium* (angel fish) *Carassius auratus* (red oranda) *Betta splendens* (Siamese fighting fish) *Trichogaster leeri* (pearl gourami). Live bearers and egg layers.

Unit 3: Important indigenous ornamental fishes **13 Lectures**

Indigenous ornamental fishes - Common indigenous ornamental fishes. Identification and biology of the common ornamental fishes. Cyprinids: *Puntius denisonii* (red line torpedo fish), *Puntius fasciatus* (melan barb), *Puntius filamentosus* (Indian tiger barb), *Puntius curmuca* (red tailed silver shark), *Danio malabaricus* (Malabar danio); Loaches: *Nemacheilus triangularis* (Zodiac loach), *Lepidocephalus thermalis* (Malabar loach); Cichlids: *Etroplus maculatus* (yellow and orange chromides), *E . suratensis* (pearl spot), Anabantids: *Anabas testudineus* (climbing perch) and Catfishes: *Horabagrus brachysoma* (Yellowish catfish), *H. nigricollaris* (White collared imperial catfish).

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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; Population 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.

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Practical

1. Study of life tables and plotting of survivorship curves of different types from the hypothetical/real dataprovided.
2. Determination of population density in a natural/hypothetical community by quadrate method and calculation of Shannon-Weiner diversity index for the same community.
3. Study of an aquatic ecosystem: Phytoplankton and zooplankton, Measurement of area, temperature, turbidity/penetration of light, determination of pH, and Dissolved Oxygen content (Winkler's method), Chemical Oxygen Demand and freeCO_2.
4. To measure microclimatic variables viz., temperature, humidity and light conditions in a microhabitat.
5. Making an ecosystem in a wide-mouthed bottle.
6. Constructing a food web by observing and collecting organisms from a given area.
7. Preparing and clearly present an essay based on the evaluation of 4-7 publications.
8. Studying insect diversity in a habitat.
9. Report on a visit to National Park/Biodiversity Park/Wild lifesanctuary.

Suggested readings

1. Colinvaux P A (1993). Ecology. II Edition. Wiley, John and Sons,Inc.
2. Krebs C J (2001). Ecology. VI Edition. BenjaminCummings.
3. Odum EP (2008). Fundamentals of Ecology. Indian Edition.Brooks/Cole.
4. Robert Leo Smith, Ecology and field biology Harper and Rowpublisher.
5. Ricklefs RE (2000). Ecology. V Edition. ChironPress.

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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.

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