



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 :2020-21

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

Sr. No.	Course Code	Name of the Course
01.	LS/ZOO/CC-102 L	Principles of Ecology
02.	LS/ZOO/GE-101 L	Aquatic Biology
03.	LS/ZOO/GE-201 L	Environment and Public Health
04.	LS/ZOO/AE-201/ES	Environmental Science
05.	LS/ZOO/GE-401 L	Insect, Vectors and Diseases
08.	LS/ZOO/DSE-601 (B) L	Fish and Fisheries
09.	LS/ZOO/DSE-601 (C) L	Wild Life Conservation and Management

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Scheme and Syllabus

Semester-wise Theory Papers/ Practical: B.Sc. Hon's (Zoology) Department of Zoology, School of Life Science

SEMESTER I						
Course Opted	Course Code	Name of the course	Credit	Hours /week	Internal Assessment	End Semester Exam.
Core Course-1 Theory	LS/ZOO/CC-101 L	Non Chordates – I (Protozoa to Pseudo celomates)	4	4	30 (15+15)	70
Core Course-1 Practical	LS/ZOO/CC-101 P	Lab Course	2	4	30 (15+15)	70
Core Course-2 Theory	LS/ZOO/CC-102 L	Principles of Biology	4	4	30 (15+15)	70
Core Course-2 Practical	LS/ZOO/CC-102 P	Lab Course	2	4	30 (15+15)	70
Generic Elective-1 Theory	LS/ZOO/GE-101 L	Aquatic Biology	4	4	30 (15+15)	70
Generic Elective-1 Practical	LS/ZOO/GE-101 P	Lab Course	2	4	30 (15+15)	70
Ability Enhancement Compulsory Course-1	LS/ZOO/AE-101/EC	English Communication / Hindi Communication	4*	4	30 (15+15)	70
Extracurricular Activity		Tour/ Field visit/ Industrial training/ NSS/ Swachhita/ Vocational Training/ Sports/ others	2	(2)		
TOTAL			24	28	30	70
SEMESTER II						
Core Course-3 Theory	LS/ZOO/CC-201 L	Non Chordates – II (Coelomates)	4	4	30 (15+15)	70
Core Course-3 Practical	LS/ZOO/CC-201 P	Lab Course	2	4	30 (15+15)	70
Core Course-4 Theory	LS/ZOO/CC-202 L	Cell Biology	4	4	30 (15+15)	70
Core Course-4 Practical	LS/ZOO/CC-202 P	Lab Course	2	4	30 (15+15)	70
Generic Elective-2 Theory	LS/ZOO/GE-201 L	Environment and Public Health	4	4	30 (15+15)	70
Generic Elective-2 Practical	LS/ZOO/GE-201 P	Lab Course	2	4	30 (15+15)	70
Ability Enhancement Compulsory Course-2	LS/ZOO/AE-201/ES	Environmental Science	4*	4	30 (15+15)	70
Extracurricular Activity		Tour/ Field visit/ Industrial training/ NSS/ Swachhita/ Vocational Training/ Sports/ others	2	(2)		
TOTAL			24	28	30	70
Summer Internship: 15 days		Swayam Swachhita / NSS / Industrial/ others	2	6h/day	--	100
SEMESTER III						
Core Course-5 Theory	LS/ZOO/CC-301 L	Diversity of chordates	4	4	30 (15+15)	70
Core Course-5 Practical	LS/ZOO/CC-301 P	Lab Course	2	4	30 (15+15)	70
Core Course-6 Theory	LS/ZOO/CC-302 L	Physiology: Controlling and Coordinating systems	4	4	30 (15+15)	70
Core Course-6 Practical	LS/ZOO/CC-302 P	Lab Course	2	4	30 (15+15)	70
Core Course-7 Theory	LS/ZOO/CC-303 L	Fundamentals of Bio-chemistry	4	4	30 (15+15)	70

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Department of Zoology, School of Life Sciences, GGV, Bilaspur (CG)

CORE COURSE II

LS/ZOO/CC-102 I

PRINCIPLES OF ECOLOGY

THEORY

(Credits 4)

Unit 1: Introduction to Ecology	6
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.	
Unit 2: Ecosystem	12
Types of ecosystems with one example in detail; 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; Nutrient and biogeochemical cycle (nitrogen cycle); Human modified ecosystem.	
Unit 3: Population	18
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.	
Unit 4: Community	10
Community characteristics: species richness, dominance, diversity, abundance, vertical stratification, Ecotone and edge effect; Ecological Succession, Types of Succession, Theories pertaining to climax community.	
Unit 5: Human impact on environment	06
Environmental Pollution: Air, water and noise pollution; Greenhouse effect, Acid rain, Global Warming, Ozone depletion.	
Unit 6: Biodiversity and Wildlife Conservation	08
Ecology in Wildlife Conservation and Management, Biodiversity; types, importance and threats. Protected areas; National parks, Bio reserves and Sanctuaries. Restoration ecology.	

Course Objectives:

To bring physical environment and living organisms together in a single framework.
To develop an appreciation of the modern scope of the scientific study in the field of ecology. To understand different types of ecosystem, extinction of species consumption, human impact on the environment.

Course Outcomes:

Develop knowledge base covering all attributes of the environment and ecology.
Illustrate the flow of energy through ecosystems with reference to trophic levels and ecological efficiency. Describe population structures and growth.

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GENERIC ELECTIVE COURSES

LS/ZOO/GE-101 L

AQUATIC BIOLOGY

THEORY

(Credits 4)

Unit 1: Aquatic Biomes

Brief introduction of the aquatic biomes: Freshwater ecosystem (lakes, wetlands, streams and rivers), estuaries, intertidal zones, oceanic pelagic zone, marine benthic zone and coral reefs.

Unit 2: Freshwater Biology

Lakes: Origin and classification, Lake as an Ecosystem, Lake morphometry, Physico-chemical Characteristics: Light, Temperature, Thermal stratification, Dissolved Solids, Carbonate, Bicarbonates, Phosphates and Nitrates, Turbidity; dissolved gases (Oxygen, Carbon dioxide). Nutrient Cycles in Lakes-Nitrogen, Sulphur and Phosphorus.

Streams: Different stages of stream development, Physico-chemical environment, Adaptation of hill-stream fishes.

Unit 3: Marine Biology

Salinity and density of Sea water, Continental shelf, Adaptations of deep sea organisms, Sea weeds.

Unit 4: Management of Aquatic Resources

Causes of pollution: Agricultural, Industrial, Sewage, Thermal and Oil spills, Eutrophication, Management and conservation (legislations), Sewage treatment Water quality assessment- BOD and COD.

Course Objective

This program helps students to study about aquatic life and equip students with skills that can later lead into a profession in aquatic biology. Aquatic biology at undergraduate level works as an entry point for future aquatic biologist. Two major aspects of Aquatic biology are study of the organisms in the freshwater (Limnology) and saline waters (Marine biology). This paper focuses on research and explains processes, structures and pathways in most aquatic and wet ecosystems. Geographically, we cover aquatic ecosystems in temperate, tropical and arctic regions, and we work with both basic and applied science.

Course Outcomes

They learn about adaptations exhibited by organisms to survive in these typical conditions. Learn about the laws governing the use of freshwater systems, as well as the local, state, federal, and international agencies. Students understand how Human activities influence the physicochemical environment of water bodies, what devastating impact it has on aquatic organisms. Understand and apply relevant scientific principle in the area of aquatic biology and educate others or work to conserve our natural resources.

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GENERIC ELECTIVE COURSES

LS/ZOO/GE-201 L

ENVIRONMENT AND PUBLIC HEALTH

THEORY

(Credits 4)

Unit 1: Introduction

Sources of Environmental hazards, hazard identification and accounting, fate of toxic and persistent substances in the environment, dose Response Evaluation, exposure Assessment.

Unit 2: Climate Change

Greenhouse gases and global warming, Acid rain, Ozone layer destruction, Effect of climate change on public health.

Unit 3: Pollution

Air, water, noise pollution sources and effects, Pollution control.

Unit 4: Waste Management Technologies

Sources of waste, types and characteristics, Sewage disposal and its management, Solid waste disposal, Biomedical waste handling and disposal, Nuclear waste handling and disposal, Waste from thermal power plants, Case histories on Bhopal gas tragedy, Chernobyl disaster, Seveso disaster and Three Mile Island accident and their aftermath.

Unit 5: Diseases

Causes, symptoms and control of tuberculosis, Asthma, Cholera, Minamata disease, typhoid

Course Objective:

To understand the direct and indirect human, ecological and safety affects of major environmental and occupational agents.

Attain knowledge about genetic, physiologic and psychosocial factors that affect susceptibility to adverse health outcomes following exposure to environmental hazards.

Specify approaches for assessing, preventing and controlling environmental hazards that pose risks to human health and safety.

To understand various waste management techniques and risks involved in event of poor management.

Understand the outbreak of certain communicable and non-communicable diseases.

Course Outcomes:

Acquire skills in the application of epidemiologic methods to environmental health problems



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GENERIC ELECTIVE COURSES

LS/ZOO/GE-201 P

ENVIRONMENT AND PUBLIC HEALTH

PRACTICALS

(Credits 2)

1. To determine Ph in soil and water samples from different locations.
2. To determine Cl in soil and water samples from different Locations
3. To determine SO₄ in soil and water samples from different Locations
4. To determine NO₃ in soil and water samples from different Locations
5. To determine BOD in water samples from different locations

SUGGESTED BOOKS

- Cutter, S.L. (1999) Environmental Risk and Hazards, Prentice-Hall of India Pvt. Ltd., New Delhi.
- Kolluru Rao, Bartell Steves, Pitblado R. and Stricoff (1996) "Risk Assessment and Management Handbook", McGraw Hill Inc., New York.
- Kofi Asante Duah (1998) "Risk Assessment in Environmental management", John Wiley and sons, Singapore.
- Kasperson, J.N. and Kasperson, R.E. and Kasperson, R.E. (2003) Global Environmental Risks, V.N. University Press, New York.
- Joseph F Louvar and B Diane Louvar (1997) Health and Environmental Risk Analysis fundamentals with applications, Prentice Hall, New Jersey.

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Core Course-7 Practical	LS/ZOO/CC-303 P	Lab Course	2	4	30 (15+15)	70
Generic Elective-3 Theory	LS/ZOO/GE-301 L	Food Nutrition and Health	4	4	30 (15+15)	70
Generic Elective-3 Practical	LS/ZOO/GE-301 P	Lab Course	2	4	30 (15+15)	70
Skill Enhancement Course-1	LS/ZOO/SEC-301 L	Sericulture	2	2	30 (15+15)	70
Skill Enhancement Course-1	LS/ZOO/SEC-301 P	Lab Course	2	4	30 (15+15)	70
TOTAL			18	14	30	70
SEMESTER IV						
Core Course-8 Theory	LS/ZOO/CC-401 L	Comparative anatomy of vertebrates	4	4	30 (15+15)	70
Core Course-8 Practical	LS/ZOO/CC-401 P	Lab Course	2	4	30 (15+15)	70
Core Course-9 Theory	LS/ZOO/CC-402 L	Physiology: Life Sustaining Systems	4	4	30 (15+15)	70
Core Course-9 Practical	LS/ZOO/CC-402 P	Lab Course	2	4	30 (15+15)	70
Core Course-10 Theory	LS/ZOO/CC-403 L	Biochemistry of Metabolic Processes	4	4	30 (15+15)	70
Core Course-10 Practical	LS/ZOO/CC-403 P	Lab Course	2	4	30 (15+15)	70
Generic Elective-4 Theory	LS/ZOO/GE-401 L	Insect Vectors and Diseases	4	4	30 (15+15)	70
Generic Elective-4 Practical	LS/ZOO/GE-401 P	Lab Course	2	4	30 (15+15)	70
Skill Enhancement Course-2	LS/ZOO/SE-401	Medical Diagnostics	2	2	30 (15+15)	70
Skill Enhancement Course-2	LS/ZOO/SE-401	Lab Course	2	4	30 (15+15)	70
TOTAL			18	14	30	70
Summer Internship: 15 days	Swachhata / NSS / Industrial / others		2	6h/day	—	100
SEMESTER V						
Core Course-11 Theory	LS/ZOO/CC-501 L	Molecular Biology	4	4	30 (15+15)	70
Core Course-11 Practical	LS/ZOO/CC-501 P	Lab Course	2	4	30 (15+15)	70
Core Course-12 Theory	LS/ZOO/CC-502 L	Principles of Genetics	4	4	30 (15+15)	70
Core Course-12 Practical	LS/ZOO/CC-502 P	Lab Course	2	4	30 (15+15)	70
Discipline Specific Elective-1 Theory	LS/ZOO/DSE-501(A) L	*A. Biology of Insect (MOCS)	4	4	30 (15+15)	70
	LS/ZOO/DSE-501(B) L	*B. Immunology (MOCS)				
Discipline Specific Elective-1 Practical	LS/ZOO/DSE-501(A) P	Lab Course A	2	4	30 (15+15)	70
	LS/ZOO/DSE-501(B) P	Lab Course B				
Discipline Specific Elective-2 Theory	LS/ZOO/DSE-502(A) L	A. Basics of Neuroscience	4	4	30 (15+15)	70
	LS/ZOO/DSE-502(B) L	B. Reproductive Biology				
Discipline Specific Elective-2 Practical	LS/ZOO/DSE-502(A) P	Lab Course A	2	4	30 (15+15)	70
	LS/ZOO/DSE-502(B) P	Lab Course B				
TOTAL			14	12		

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GENERIC ELECTIVE COURSES

LS/ZOO/GE-401 L

INSECT VECTORS AND DISEASES

THEORY

(Credits 4)

Unit I: Introduction to Insects 6
General Features of Insects, Morphological features, Head – Structure and orientation of Head, Eyes, Types of antennae, Mouth parts w.r.t. feeding habits. Outline classification of insects up to orders, detailed features of orders with insects as vectors- Diptera, Siphonaptera, Siphunculata, Hemiptera.

Unit II: Insect Vectors 14
Brief introduction of Carrier and Vectors (mechanical and biological vectors), Reservoirs, Host-pathogen interaction and relationship.

Unit III: Diptera as Disease Vectors 24
Dipterans as important insect vectors – Mosquitoes, Sand fly, Houseflies; Study of mosquito-borne diseases – Malaria, Dengue, Filariasis; Control of mosquitoes; Study of sand fly-borne diseases – Visceral Leishmaniasis, Phlebotomus fever; Control of Sand fly; Study of house fly as important mechanical vector, Myiasis, Control of house fly.

Unit IV: Siphonaptera as Disease Vectors 6
Fleas as important insect vectors; Host-specificity, Study of Flea-borne diseases – Plague, Typhus fever; Control of fleas.

Unit V: Siphunculata as Disease Vectors 4
Human louse (Head, Body and Pubic louse) as important insect vectors; Study of louse-borne diseases –Trench fever, Vagabond's disease, Control of human louse.

Unit VI: Hemiptera as Disease Vectors 6
Bugs as insect vectors; Blood-sucking bugs; Cimex Chagas disease, Bed bugs as mechanical vectors, Control and prevention measures.

Course Objective:

Insect vectors cause many diseases which lead to millions of deaths across the world especially in developing countries. The rate of pathogen spread by insects is increasing at an alarming pace posing a growing threat to the human population. Disease transmission by these insects can be prevented only by studying their biology, modes of transmission of pathogens by them, evaluation of associated risk factors, devise effective methods to control these insects and resolve the challenges posed.

Course outcomes

Describe the host-pathogen relationships and the role of the host reservoir on transmission of parasite. Explain control methods of insect vector diseases including preventing their spread, spreading awareness on public health programs and mitigating insect borne diseases. Employ the use of advanced management strategies in disease control with respect to parasite evolution.

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Core Course-10 Practical	LS/ZOO/CC-403 P	Lab Course	2	4
Generic Elective-4 Theory	LS/ZOO/GE-401 L	Insect Vectors and Diseases	4	4
Generic Elective-4 Practical	LS/ZOO/GE-401 P	Lab Course	4	4
Skill Enhancement Course-2	LS/ZOO/SE-401	Medical Diagnostics	2	2
Skill Enhancement Course-2	LS/ZOO/SE-401	Lab Course	2	4
TOTAL			28	34
Summer Internship: 15 days Swayam Swachhita / NSS / Industrial/ others			1	100
Semester V				
Core Course-11 Theory	LS/ZOO/CC-501 L	Molecular Biology	4	4
Core Course-11 Practical	LS/ZOO/CC-501 P	Lab Course	2	4
Core Course-12 Theory	LS/ZOO/CC-502 L	Principles of Genetics	4	4
Core Course-12 Practical	LS/ZOO/CC-502 P	Lab Course	2	4
Discipline Specific Elective-1 Theory	LS/ZOO/DSE-501(A) L LS/ZOO/DSE-501(B) L LS/ZOO/DSE-501(C) L	A. Basics of Neuroscience B. Endocrinology C. Immunology	4	4
Discipline Specific Elective-1 Practical	LS/ZOO/DSE-501(A) P LS/ZOO/DSE-501(B) P LS/ZOO/DSE-501(C) P	Lab Course A Lab Course B Lab Course C	2	4
Discipline Specific Elective-2 Theory	LS/ZOO/DSE-502(A) L LS/ZOO/DSE-502(B) L LS/ZOO/DSE-502(C) L	A. Animal Behavior and Chronobiology B. Parasitology C. Reproductive Biology	4	4
Discipline Specific Elective-2 Practical	LS/ZOO/DSE-502(A) P LS/ZOO/DSE-502(B) P LS/ZOO/DSE-502(C) P	Lab Course A Lab Course B Lab Course C	2	4
TOTAL			24	32
Semester VI				
Core Course-13 Theory	LS/ZOO/CC-601 L	Developmental Biology	4	4
Core Course-13 Practical	LS/ZOO/CC-601 P	Lab Course	2	4
Core Course-14 Theory	LS/ZOO/CC-602 L	Evolutionary Biology	4	4
Core Course-14 Practical	LS/ZOO/CC-602 P	Lab Course	2	4
Discipline Specific Elective-3 Theory	LS/ZOO/DSE-601(A) L LS/ZOO/DSE-601(B) L LS/ZOO/DSE-601(C) L	A. Biology of Insects B. Fish and Fisheries C. Wild Life Conservation and Management	4	4
Discipline Specific Elective-3 Practical	LS/ZOO/DSE-601(A) P LS/ZOO/DSE-601(B) P LS/ZOO/DSE-601(C) P	Lab Course A Lab Course B Lab Course C	2	4
Dissertation/ Project work / Academic Visit followed by report submission and seminar	LS/ZOO/DW/PW/AV		5+1=6	8
TOTAL			24	32
TOTAL CREDITS			152 + 4 (SI)	

As per UGC CDCS guidelines, University / departments have liberty to offer GE and SEC courses offered by any department to students of other departments. The No. of GE course is four. One GE course is compulsory in first 4 semesters each. In present scheme it is proposed to have minimum two GE courses (from one subject) in first two semester after which student shall change two GE for another subject in IIIrd and IVth semester, so that all the student can have exposure of one additional subject.
(Subject to approval by the competent authority)

Changela
External Expert

Dr. Rohit Seth
06/07/18

Sanjiv Singh
06/07/18

Mouk
06/07/18
Head of the Department

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Department of Zoology, School of Life Sciences, GGV, Bilaspur (CG)

DISCIPLINE SPECIFIC ELECTIVE COURSE

LS/ZOO/DSE-601(B) I.

FISH AND FISHERIES

THEORY

(Credits 4)

Unit 1: Introduction and Classification	6
General description of fish; Account of systematic classification of fishes (upto classes); Classification based on feeding habit, habitat and manner of reproduction.	
Unit 2: Morphology and Physiology	16
Different types of fins and scales; Use of scales in classification and determination of age of fish; Gills and gas exchange; Swim Bladder: types and role in respiration, buoyancy, Osmoregulation and ionic balance in fishes; Reproductive strategies (special reference to Indian fishes); Electric organs; Bioluminescence; Schooling; Parental care; Migration	
Unit 3: Fisheries	10
Inland Fisheries; Marine Fisheries; Environmental factors influencing the seasonal variations in fish catches in the Arabian Sea and the Bay of Bengal; Fishing crafts and Gears; Depletion of fisheries resources; Application of remote sensing and GIS in fisheries; Fisheries law and regulations	
Unit 4: Aquaculture	16
Sustainable Aquaculture; Extensive, semi-intensive and intensive culture of fish; Qualities of culturable species of fishes; Types of pond in a fish farm; Pen and cage culture; Integrated fish farming; Composite fish culture; Brood stock management; Induced breeding of fish; Hatchery, Preparation of compound diets for fish; Role of water quality in aquaculture; Fishery by-products	
Unit 5: Fish Pathology and Cure	8
Sign of sickness in fishes, defensive devices in fishes against diseases, diseases of fishes: Nutritional diseases, bacterial disease (Infectious dropsy, Tail rot or fin rot), Fungal diseases (Dermatomycozes, Branchiomycozes) and protozoan diseases (Ichthyophthiriasis, Costinosis).	
Unit 6: Fish in research	4
Transgenic fish, Zebrafish as a model organism in research	

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DISCIPLINE SPECIFIC ELECTIVE COURSE

LS/ZOO/DSE-601(C) L

WILD LIFE CONSERVATION AND MANAGEMENT

THEORY

(Credits 4)

Unit 1: Introduction to Wild Life	12
Wildlife: Current status in India, Zones of Faunal-distribution in India and their characteristics; Values of wild life - positive and negative; Conservation ethics; Importance of conservation; Causes of depletion; World conservation strategies	
Unit 2: Evaluation and management of wild life	12
Habitat analysis. Physical parameters: Topography, Geology, Soil and water; Biological Parameters: food, cover, forage, browse and cover estimation; Standard evaluation procedures: remote sensing and GIS.	
Unit 3: Management of habitats	8
Setting back succession; Grazing logging; Mechanical treatment; Advancing the successional process; Cover construction; Preservation of general genetic diversity; Restoration of degraded habitats;	
Unit 4: Population estimation	14
Population density, Natality, Birth rate, Mortality, fertility schedules and sex ratio computation; Faecal analysis of ungulates and carnivores: Faecal samples, slide preparation, Hair identification, Pug marks and census method.	
Unit 5: Management planning of wild life in protected areas	8
National parks & sanctuaries, Community reserve; Estimation of carrying capacity; Eco tourism / wild life tourism in forests; Concept of climax persistence; Ecology of perturbation; Tiger conservation in India	
Unit 6: Management of excess population	6
Bio- telemetry; Care of injured and diseased animal; Quarantine; Common diseases of wild animal	

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