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List of Employability/ Entrepreneurship/ Skill Development Courses with Course Contents

Colour Codes		
Name of the Subjects	Yellow	
Employability Contents	Green	
Entrepreneurship Contents	Light Blue	
Skill Development Contents	Pink	



**List of Courses Focus on Employability/ Entrepreneurship/
Skill Development**

Department : Zoology

Programme Name : Pre- Ph.D. course work

Academic Year : 2018-19

List of Courses Focus on Employability/ Entrepreneurship/Skill Development

Sr. No.	Course Code	Name of the Course
01.	Paper I	Research Methodology
	Paper II	Biotechniques, Biochemistry and toxicology
02.	Paper III	Endocrinology, Neuroscience and Fisheries



Scheme and Syllabus

Pre Ph.D.
2018-19

DEPARTMENT OF ZOOLOGY GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR

MINUTES OF THE MEETING OF BOARD OF STUDIES IN ZOOLOGY GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR HELD ON 30/04/2019

A meeting of Board of Studies in Zoology under School of Life Sciences was convened in the chamber of Head, Department of Zoology, on 30/04/2019 at 2 pm for approval of syllabus and scheme of examination of Pre Ph. D. Course work in Zoology.

The following members were present during the meeting:

Dr. Monika Bhadauria	:	Chairman
Dr. Sangeeta Shukla	:	External expert member (Could not attend meeting)
Dr. Rohit Seth	:	Member
Dr. Santosh Singh	:	Member

Soft copy of proposed syllabus was sent to the external expert, Prof Sangeeta Shukla, Vice Chancellor, Jiwaji University, Gwalior (MP) through email. She made necessary corrections in the syllabus and sent it back by email for further necessary action. The revised syllabus was placed before Board of Studies for approval.

The existing syllabus of Pre Ph. D. course work for Zoology was carefully scrutinized and changes were made in existing paper as per the suggestion suggested by external expert and members of the board. As per the approved Ph.D. regulation, GGV (amended) of 2018, the syllabus of Pre Ph. D. course work will consist of three papers. The first paper is compulsory and based on research methodology. The second and third papers will be based on available specialization.


The distribution of credits is as follows:

S No.	Paper	Credits	Marks
01	Research Methodology	04	100
02	Bio-techniques, Biochemistry and Toxicology	04	100
03	Endocrinology, Neuroscience and Fish Biology	04	100
04	Seminar		Mandatory

The corrected version approved by BOS members with their initials/signature is attached herewith for further necessary action. Meeting ended with the vote of thanks. Special thank was extended for kind cooperation of external member Prof. Sangeeta Shukla who made necessary corrections to make the syllabus up to the mark.


Prof. Sangeeta Shukla


Dr. Rohit Seth


Dr. Santosh Singh


Dr. Monika Bhadauria



SYLLABUS FOR PRE-Ph. D. COURSE WORK (ZOOLOGY) Session: 2018-2019

Department of Zoology
Guru Ghasidas Vishwavidyalaya, Bilaspur, CG

PAPER 1: RESEARCH METHODOLOGY

Unit 1: Introduction to research

Meaning of research, objectives of research, research process, criteria of good research, defining the research problem, basic principles of research design, developing a research plan, sample design, characteristics of good sampling procedure, types of data.

Unit 2: Basics of scientific communication

Types of scientific communication, importance of publishing research papers, review, choosing journals, constituents of research paper: title, running title, authorships, abstracts, keywords, introduction, materials and methods, results, discussion, acknowledgements, referees, figures, table components, communication with the editors, handling referees comments, galley proofs. Plagiarism. Writing review articles, Preparing and delivering of oral and poster presentations. Intellectual Property Rights.

Unit 3: Statistical Analysis

Methods of data collection; Graphical representation of data; Measurement of central tendency: Definition, characteristics, types, merits and demerits. Measurement of dispersion: Range, Mean deviation, Standard deviation, Standard error, Variance, Correlation and Regression and their coefficients. Test of significance: Student's t test, Chi-square test and ANOVA.

Unit 4: Computer Application

Basics of computers; MS Word: typing the script, inserting tables, figures and graphs to prepare thesis and research papers; MS Excel: designing and application of formulae use of statistical tools, preparation of graphs, histograms and charts; MS power point: insertion of figures, graphs, charts in presentation; Preparation of posters for scientific presentations.

Unit 5: Microscopy

Basic principle, constituents and biological applications of Bright-field microscope, Dark-field microscope, Phase contrast microscope, Differential interference contrast microscope, Fluorescence microscope, Confocal microscope, Atomic force microscopy, Transmission and scanning electron microscope.

Unit 6: Spectroscopy

Electromagnetic spectrum, Lambert Beers's Law, Photometry, UV/VIS Spectrophotometry. Atomic absorption spectroscopy, ESR and NMR spectroscopy, Mass spectroscopy. (LC-MS, GC-MS), Fluorescent spectroscopy.



PAPER II: BIOTECHNIQUES, BIOCHEMISTRY AND TOXICOLOGY

Unit 1: Centrifugation and Electrophoresis

Principle, types and applications of Centrifugation; Electrophoresis: principle and applications, Types: PAGE (native and SDS), agarose gel electrophoresis, 2D electrophoresis, Blotting: Southern, western and northern blotting.

Unit 2: Chromatography

Chromatography: principle, types and applications of thin layer, gas, gel filtration, ion exchange, HPLC, FPLC and affinity chromatography.

Unit 3: Bio-molecules and their interaction

Structure and classification of biomolecules; Carbohydrate: Glycogenesis, glycogenolysis, pentose phosphate pathway; Lipids: biosynthesis and degradation, β -oxidation; Amino acids: Transamination, Deamination: transdeamination and oxidative deamination; Toxicity of ammonia: Ammonia detoxification; Urea cycle: Reactions and their regulation.

Unit 4: Apoptosis

Process of apoptosis: Induction and biochemical changes, Execution: cytochrome C release, caspase action, Phagocytosis of apoptotic bodies; intrinsic and extrinsic pathways. Introduction to autophagy

Unit 5: Free radical reaction in biological system and oxidative stress

Classification of toxic substances; Dose response relationships, LD_{50} , LC_{50} , TD_{50} and therapeutic index; Nature of free radicals; Initiation, propagation and termination radical reactions; electron transfer; Formation of free radicals in lipids and lipid membranes; Toxicological consequences of oxidative stress on protein and lipid.

Unit 6: Antioxidant defence mechanism

Enzymatic and Non enzymatic antioxidants; Role of glutathione, superoxide dismutases, catalases and peroxidases, Metallothionein and tocopherols as antioxidants; Metabolism (Phase-I and phase II reactions) and excretion of xenobiotics; Hepatic defence against toxicity, LFTs and KFTs: physiological, biochemical and pathological response.



PAPER III: ENDOCRINOLOGY, NEUROSCIENCE AND FISH BIOLOGY

Unit I: Hormone and Signaling Mechanism

Principles of Endocrinology; Functions of hormones and their regulation; Chemical Signaling: endocrine, paracrine, autocrine and intracrine mechanisms; Chemical classification of hormones and their synthesis; Hormone receptors and action mechanism; Hormones and immune system; Growth promotion and cancer; Gene mutation and endocrine function

Unit II: Molecular Endocrinology

Endocrine pancreas and diabetes; Thyroid gland and metabolism; Adrenal gland stress response; Hormones and calcium homeostasis; Gonadotropins, Gonads and sex steroids; Endocrine changes during puberty; Hormone replacement therapy; Hypothalamo-hypophysial system; Pineal gland and melatonin; Concept of chronobiology

Unit 3: Basics of Neuroscience

Introduction to the structure and function of Neurons; Generation, conduction and properties of the action potential and role of sodium and potassium pumps; Synaptic action, dendritic properties and functional operation of: Auditory system; Visual system and Olfactory system.

Unit 4: Neuroendocrinology

The hypothalamo - hypophyseal gonadal axis - interface of hormones and the nervous system. Sex differences in the brain, hormone action in the brain, and the control of energy balance; An introduction to biological clock and its significance and hypothalamic regulation of biological rhythm.

Unit 5: Fish Culture

Fish culture systems; Integrated fish farming, Composite fish farming, Criteria of selection of cultivable fishes, Age and growth: Growth rate and aging, Length weight relationship, gonadosomatic index, Functional morphology of gonads, Role of hypothalamo-hypophyseal hormones in reproduction; Induced breeding in fishes.

Unit 6: Fish Anatomy and Physiology

General organization of epidermis and dermis; Gill structure and physiology of gill respiration; modifications of alimentary canal in relation to food and feeding habits; fish kidney; water and ion balance; General organization of circulatory system; Fish Brain, Structure and function of thyroid, ultimobranchial gland, pancreas, adrenal, corpuscles of Stannius, urophysis and Pineal.