Programme Outcomes, Programme Specific Outcomes and Course Outcomes For PG Programmes

Programme Name: ***M.Sc in Zoology***
(e.g *M.Sc in Physics/ MA in Bengali/MCA etc.)*

Number of Semesters: 04(Four)

Name of the Department
University of North Bengal
West Bengal, INDIA

Programme Outcomes

- Inculcate critical thinking to carry out scientific investigation objectively.
- Equip the student with skills to analyze problems, formulate a hypothesis, evaluate and validate results, and draw reasonable conclusions thereof.
- Prepare students for pursuing research or careers in industry in Animal Sciences and applied fields
- Prepare students for pursuing teaching careers in Schools, Colleges and Universities
- Imbibe effective scientific and/or technical communication in both oral and writing.
- Continue to acquire relevant knowledge and skills appropriate to professional activities and demonstrate highest standards of ethical issues in animal sciences.
- Create awareness to become an enlightened citizen with commitment to deliver one's responsibilities to the society and the Country at large.

Programme Specific Outcomes

- Understanding of the fundamental theories of living world and capability of developing ideas based on them.
- Inculcate objective reasoning.
- Prepare and motivate students for research studies in Zoology and related fields.
- Provide knowledge of a wide range of scientific techniques and application of methods/tools in related fields.
- Provide advanced knowledge on topics in latest developments in the fields of Animal Sciences, empowering the students to pursue higher degrees at reputed academic institutions.
- Nurture problem solving skills, thinking, creativity through assignments, project work.
- Assist students in preparing for competitive exams such as UGC-NET, GATE etc.

Course Outcomes

SEMESTER—I		
Course Code	Course Name	Course Outcomes
ZCT-101	**Functional Biology of Non-chordates**	Knowledge gained • Concept of maintenance systems in non-chordates. • Concept of support, control and development system in non-chordates. Skills gained • Elucidating the role of maintenance, support, control and development systems in identifying non-chordates. • Understanding the type, structure and organization of larval forms in non-chordates. Competency developed • Understanding the co-relationship between structure and

		function in the non-chordate systems .
ZCT-102	**Functional Biology of Chordates**	Knowledge gained: • Concept and definition of the Chordate group. • Collaboration of structure and function. • Functional basis of body structures and Organ systems. • Relationships of the Chordates with such other animal groups/Phyla • Evolution and functional relationships of particular organ/structure/feature. Skills gained: • Learning to identify the Chordates. • Interlinking different strata of organizations of the Chordate Tissue/Organ systems. • Ability to generate hypothesis in Chordate structures. • To analysis the diversity of functions and their relations with the environment. Competency developed: • Understanding the structure-function relationship in the Vertebrate systems. • Appreciation of the Evolutionary theories in the development of Structure and Function • Facility in solving real life problems by thinking logically and outside of box.
ZCT-103	**Biochemistry**	Knowledge gained • To develop concept about structure and function about biological macromolecules essential to life • To make understanding about different monomeric units their source, structure, function in different biological systems • Structural abnormalities and disease in animals • Concept of biosynthesis, bioenergetics, metabolism and biotransformation of individual biomolecules Skills gained • Understanding the corelationship that exists between structure and function of individual biomolecules • Understanding the bioenergetics and metabolism of different biomolecules. Competency developed • Understanding the role of biomolecules in the functioning of cell as a whole and interlinking of various pathways related to biosynthesis, bioenergetics, metabolism and biotransformation.
ZCT-104	**Cell Biology and Genetics**	Knowledge gained • Gene concept, genome organization • Site specific recombination and its applications. • Gene regulation, concept of mobile genetic elements and applications, concept of gene mapping. • Molecular diagnosis of Genetic disorders. • Protein synthesis & chaperon, Cell cycle & cancer, concept of apoptosis, Organization of Mt-DNA Skilled Gained

		• Understanding of molecular processes based on the concept • Basic techniques Competency developed • Concepts and techniques learned can be used to understand many health problems in population. • Screening of genetic disorders
ZCP-101	**Non-Chordate and Chordate**	Knowledge gained: • To obtain the knowledge of the taxonomy of non chordates. • To understand characteristics of non chordates in relation to the taxonomy. Skills gained: • To understand the morphological and anatomical features of selected non chordates. • To identify and classify non-chordate specimen in the field. • To know about some of the important and common protozoans, helminthes and arthropods of parasitic nature causing diseases. Competency developed: • To create awareness about the harmful parasites and the economic importance of non chordates. • To be able to identify and classify non-chordate specimen in the field. • To maintain and organize museum specimen.
ZCP-102	**Genetics and Cell Biology**	Knowledge gained • Concept of chromosome preparation • Gene frequency, Barr body preparation • DNA isolation Skill gained • Preparation of human karyotype and understanding of genetic disorders • Gene frequency calculation Competency developed • Competent to understand calculate frequency disease allele in population.
ZCC-101 – 104	**Class Test**	Knowledge gained • Comprehensive understanding of the subject Skill gained • How to answer different types of questions Competency developed • Can face different competitive exams.
ZCE-101	**Seminar**	Knowledge gained • Detailed knowledge on particular topic Skill gained • Power point presentation • Oral and writing communication Competency developed • Equip students to face interviews

SEMESTER—II		
Course Code	Course Name	Course Outcomes

ZCT-201	**Immunology**	Knowledge gained: • To obtain the knowledge of the mammalian immune system. • To understand the evolution of immune mechanisms. • To analyze and inculcate the fundamental knowledge on immune system and immunological responses to antigens. • Understand the immune mechanisms in disease control, vaccination, process of immune interactions. Skills gained: • Conceptualize how the innate and adaptive immune responses coordinate to fight invading pathogens. • Determine what immunomodulatory strategies can be used to enhance immune responses or to suppress unwanted immune responses such as might be required in hypersensitivity reactions, transplantations or autoimmune diseases. Competency developed: • Critically review the sample literature to determine the strengths and weaknesses of the data published in immunology and its novelty. • Explore strategies to improve existing vaccines and how to approach these.
ZCT-202	**Ecology and Aquaculture**	Knowledge gained • Concept of ecology pertaining to community, population, fresh water and terrestrial conditions, wild life and behaviour • Concept on the environment, aquaculture, and fisheries. • Detailed understanding of different forms of ecology and their importance on proper maintenance at the present era. • Detailed understanding of the different forms of aquaculture and fisheries. • Knowledge of advanced techniques used in aquaculture and fisheries. • Knowledge of the National Fisheries Development Board, Department of Fisheries, Ministry of Fisheries, Animal Husbandry and Dairying, Govt. of India and their impact on GDP of the country. Skills gained • Learning the different concepts of ecology • Advanced techniques used in aquaculture and fisheries to increase the rate of production of the cultured as well as capture species according to the increasing demand of the market. • Trained how to utilize the natural water resource for the production of aquaculture based organisms. • Encourage to adopt as a skill for employment by performing directly as a farm owner, researcher, or even as a worker to upgrade the socio-economic status of the people. Competency developed • Understanding the concept of ecology in-depth • Develop the ability to construct fish farm independently. • Develop the ability to research in the field of fish biology for more products in aquaculture and fisheries. • Develop the ability to guide (consultancy) layman individual in his/her difficulties during the construction as well as to run a fish farm successfully.
ZCT-203	**Insect Biology**	• To develop concept about hexapod classification, different major insect orders

		• To gain in depth knowledge about different insect maintenance system. • To develop concept about insect pests, pest control methods, IPM strategy in different commercial crops • To acquire in depth knowledge about insect vector biology, disease they cause, endemicity of disease and about control measures.
ZCT-204	**Biotechnology**	Knowledge gained: • Universality of living systems and applicability of same rules across living organisms. • Advanced concepts of molecular genetics. • Advanced protocols of Microbiology and Molecular Biology. • Learning application of molecules in modifying organisms and cells. • Learning procedures of making biotechnological products. Skills gained: • Learning procedures of molecular biology to apply in changing biochemical pathways. Competency developed: • Basic molecular biological techniques to manipulate DNA, RNA and Proteins.
ZCP-201	**Biochemistry, Ecology and Aquaculture**	Knowledge gained • Concept of estimation of sugar, protein, oil and fat. • Concept of water and soil analysis • Concept of primary productivity • Estimation of zoo- and phytoplanktons of fish ponds and streams • Determination of quadrat size by species area curve • Basic concepts on limnological apparatus and ecological specimens Skills gained • How to estimate sugar, protein, oil and fat • How to analyze water and soil samples • How to determine primary productivity • How to estimate zoo- and phytoplanktons • How to determine optimum quadrat size • How to identify limnological apparatus and ecological specimens Competency developed • Competent to understand and measure the basic biomolecules • Competent to carry out water and soil analysis • Competent to determine primary productivity • Competent to estimate zoo- and phytoplanktons • Competent to determine optimum quadrat size • Competent to to identify limnological apparatus and ecological specimens
ZCP-202	**Immunology and Biotechnology**	Knowledge gained: • To know the principle and protocols of various immunological techniques that include study of lymphoid organs *in situ,* Collection of plasma and serum, Determination of antibody titre by Haemagglutination test, Preparation of lymphocytes suspension from solid lymphoid tissues, Separation of immune-reactive cell types and viability test etc. Skills gained: • Localization of lymphoid organs *in situ.* • To be able to collect plasma and serum from animal blood.

		• Determination of antibody titre in immunized mouse by Haemagglutination test. • Preparation of lymphocytes suspension from solid lymphoid tissues in laboratory mouse • Separation of immune-reactive cell types in immunized mouse and perform viability test. Competency developed: • Critically estimate antibody titre. • Isolate immune-reactive cell types from immunized mouse and understand their use for experimental purpose.
ZCC-201 – 204	**Class Test**	Knowledge gained • Comprehensive understanding of the subject Skill gained • How to answer different types of questions Competency developed • Can face different competitive exams.
ZCE-201	**Review of Published Articles**	Knowledge gained • Intensive knowledge about a particular field and tools and techniques involved for studying a particular field. Skill gained • Equipped to compile scientific resources published in journals motivated for Researches or Higher studies. Competence Developed • Competent to design and develop research ideas in relevant field. • Competent to appear in Competitive exams. • Competent in Oral and writing communication**.**
SEMESTER—III		
Course Code	Course Name	Course Outcomes
ZCT-301	**Biodiversity and Wildlife**	Knowledge gained: • Concept of origin and diversity of life. • Ability to look at and study organismic diversity at various levels- species, genetic and ecosystem. • Valuation of Biodiversity • Learn to measure and estimate biodiversity. • Lear to assess wildlife treat status and issues. • Threats responsible for decimation of Biodiversity and Wildlife. • How to tackle issues of sustainable development and conservation of Biodiversity and Wildlife. • Conservation of Wildlife. Skills gained: • Learning to measure biodiversity. • Learning various aspect of wildlife ecology and conservation. Competency developed: • Assessment of biodiversity. • Basics of conservation measure in Wildlife.
ZCT-302	**Biophysics and**	Knowledge gained • Learn the principles and uses of different analytical instruments like

	Biostatistics	spectrophotometer, spectrofluorometer and mass spectrometry • Learn the different types of microscopy, chromatography, electrophoresis and centrifugation and their respective applications. • Learn the basic concepts of crystallography, x-ray diffraction and NMR and their usage • Details of radioisotope techniques and their application in biology • Basic concept of biostatistics. • Advanced knowledge of the data interpretations and analysis following well established bio-statistical methods. • Knowledge of the application of biostatistics in the field of experiments. Skills gained • Understand the basic terms and concepts of Biophysics. • Are able to describe biophysical phenomena with simple physical models. • Understand complex experimental setups in modern experimental Biophysics. • Can apply basic biophysical methods to current issues in molecule and cell Biology. • Develop the skill to analyses dada in a more clarified way. • Develop the idea to represent the data in a well-organized and attractive style. Competency developed • Are able to describe biological phenomena with physical models of different complexity. • understand modern measurement techniques and are able to use complex measuring equipments. • Have the ability to make measurements and analyze the data of advanced physical experiments. • Better assessment of data. • Develop the ability to analyze data.
ZCT-303	**Developmental Biology and Gamete Biology**	Knowledge gained: • In-depth knowledge in gamete biology and subsequent development of embryo after fertilization. • Put on the light on the incidence of sex determination and different kinds of intersex individuals of the society. • Advanced understanding of activity and function of genes under different cellar environment. • Different modes of cell-cell communications. • Detailed knowledge of ovulation, pregnancy, and parturition associated with advanced technology like cryopreservation, IVF, stem cell renewal, etc. • Hands-on-training on embryo analysis and developmental studies. • Knowledge of histological techniques. Skills gained: • Develop the skill to analyze the function of different biological molecules during the formation and development of an embryo. • Develop the idea of different deformities/abnormalities developed during embryo development or even after birth. • Develop the skill to prepare serial sections of the embryo following histological technique.

		Competency developed: • Gained the ability to understand surprising activities performed by one cell/oocyte/sperm. • Develop the interest of the students to carry research in the field of reproductive biology and developmental biology associated with human welfare.
ZET-301	**Cellular and Molecular Immunology**	Knowledge gained: • Students will gain a foundation in immunological processes • They will understand how the immune system works, building on their previous knowledge from biochemistry, genetics, cell biology and microbiology Skills gained: • Be able to clearly state the role of the immune system. • Be able to compare and contrast the innate versus adaptive immune systems. • Be able to articulate the roles of innate recognition receptors (i.e. Toll-Like Receptors) in immune responses. • Be able to compare and contrast humoral versus cell-mediated immune responses. • Be able to distinguish various cell types involved in immune responses and associated functions. • Be able to articulate the roles of innate recognition receptors (i.e. Toll-Like Receptors) in immune response. • Be able to compare and contrast humoral versus cell-mediated immune responses. • Be able to distinguish various cell types involved in immune responses and associated functions. • Be able to distinguish and characterize CD4+ T helper cell lineages Th1, Th2, Th17, and regulatory T cell (Treg). • Be able to distinguish and characterize antibody isotypes, development, and functions. Competency developed: • Understand the role of cytokines in immunity and immune cell activation; and be able to identify and characterize cytokines of particular immune importance. • Understand the significance the Major Histocompatibility Complex in terms of immune response and transplantation. •
ZET-302	**Ecology**	Knowledge gained • Learn the principles pertaining to limiting factors • Learn the basic concepts of habitat and niche • In-depth knowledge of soil and different aspects pertaining to soil composition, profile, formation, classification and distribution • Advanced concept of radiation ecology • Learn the advanced concepts of biological rhythms, ecosystem development, human ecology, wild life ecology and community ecology. Skills gained • Learning to understand the concepts related to organism and its environment Competency developed • Assessment of principles pertaining to survival of an organism in its immediate environment • Assessment of problems related to habitat and niche, soil, radiation,

		biological rhythms, ecosystem development, human ecology, wild life ecology and community ecology.
ZET-303	**Insect Physiology & Biochemistry and Industrial Entomology**	• To develop concept about different physiological systems of insects. • To gain in depth knowledge about insect immunity, insect growth and development • To develop concept about different commercial products by insects, the insect involved etc • To develop concept about aesthetic value of different insect based products
ZET-304	**Applied Ichthyology and Aquaculture**	Knowledge gained: • In-depth knowledge of fish biology, aquaculture, and fisheries. • In-depth knowledge of limnology parameters. • Detailed understanding of different forms of fish farming. • Detailed knowledge of fish nutrition, fish feed formulation, fish toxicants, and organic farming. • Knowledge of advanced techniques used in aquaculture and fisheries. • Current knowledge on fish reproduction. • Knowledge of the National Fisheries Development Board, Department of Fisheries, Ministry of Fisheries, Animal Husbandry and Dairying, Govt. of India and their impact on GDP of the country. Skills gained: • Advanced techniques used in aquaculture and fisheries to increase the rate of production of the cultured as well as capture species according to the increasing demand of the market. • Trained how to utilize the natural water resource for the production of aquaculture based organisms. • Skilled to prepare homemade artificial fish food with in-depth knowledge of its ingredients. • Advance techniques of induced breeding in fish. • Encourage to adopt as a skill for employment by performing directly as a farm owner, researcher, or even as a worker to upgrade the socio-economic status of the people. Competency developed: • Develop the ability to construct fish farm independently. • Develop the ability to research in the field of fish biology for more products in aquaculture and fisheries. • Develop the ability to guide (consultancy) layman individual in his/her difficulties during the construction as well as to run a fish farm successfully.
ZET-305	**Molecular Cell Biology**	Knowledge gained: • Learn Cell/Tissue about culture media, properties, and preparation. • Learn Primary cell culture, cell lines, Lymphocyte culture, Fibroblast culture, iii) Isolation of clones & Genetic variants, iv) Transformation of cell, v) Cell separation by FACS, Application of Cell culture, Spectral Karyotyping, FISH & its application • Details and importance of Telomere shortening and its replication • Advanced aspects of Transcription: i) Regulatory elements, DNA binding motifs of transcription factors, ii) Activators and Repressors of transcription iii) degradation of mRNAs, iv) Catalytic RNAs and Regulatory RNAs. • Advanced aspects of Translation: i) Regulation of translation, Post

		translational modifications ii) Protein degradation iii) Regulation of Translation • Details of Mitochondrial genome, Gene Organization, its replication, mutations and diseases. • Molecular details of Prion proteins, prion replication, prion diseases. • Gene regulation in Eukaryotes: i) Alternative splicing, (ii) Post transcriptional gene silencing, (iii) Chromatin remodeling in gene regulation • Cell-cell signaling: i) Cell surface receptors, ii) G-protein coupled receptors, Signal amplification, iii) Signaling pathways - Cytokine receptor and JAK-STAT pathway, MAP kinase pathway, RTK and RAS Pathway • Stem Cell: i) Biology, Genetic regulation of stem cell and its application, • Biology of aging: cellular and molecular basis of aging and its genetic control. • Molecular Virology: i) Biology, entry and replication strategy of DNA & RNA human viruses. Skills gained: • Study the development of theories and concepts of molecular cell biology. • Detailed understanding of latest findings in Cell Biology and Molecular genetics. Competency gained: • Appreciate interlinking of various metabolic pathways. • Understanding the concept of whole in cell.
ZCP-301	**Developmental Biology and Gamete Biology**	Knowledge gained: • In-depth knowledge in gamete biology and subsequent development of embryo after fertilization. • Put on the light on the incidence of sex determination and different kinds of intersex individuals of the society. • Advanced understanding of activity and function of genes under different cellar environment. • Different modes of cell-cell communications. • Detailed knowledge of ovulation, pregnancy, and parturition associated with advanced technology like cryopreservation, IVF, stem cell renewal, etc. • Hands-on-training on embryo analysis and developmental studies. • Knowledge of histological techniques. Skills gained: • Develop the skill to analyze the function of different biological molecules during the formation and development of an embryo. • Develop the idea of different deformities/abnormalities developed during embryo development or even after birth. • Develop the skill to prepare serial sections of the embryo following histological technique. Competency developed: • Gained the ability to understand surprising activities performed by one cell/oocyte/sperm. • Develop the interest of the students to carry research in the field of reproductive biology and developmental biology associated with human welfare.

ZCC-301 – 303	**Class Test**	Knowledge gained • Comprehensive understanding of the subject Skill gained • How to answer different types of questions Competency developed • Can face different competitive exams.
ZCE-301	**Seminar / Biodiversity Field Study**	Knowledge gained • Knowledge gained on various aspects of Biodiversity • Intensive study on particular topic. Skill gained • Oral/writing ability and communication. • Ability of compilation of scientific resources published in journals. • Power point presentation. Competence Developed • Competent to face mass interview. • Understanding of nature and its importance to society
ZCE-302	**Institutional/ Field Training**	Knowledge gained • Advance knowledge and ideas about researches undergoing in different institutions of reputation. Skill gained • Details of tools and techniques learned in theory were observed. • Equipped with knowledge of advance and sophisticated instruments used in Biological researches. Competence Developed • Motivated for perusing future research.

SEMESTER—IV

Course Code	Course Name	Course Outcomes
ZCT 401	**Animal Physiology & Endocrinology**	Knowledge gained: • In-depth analytical knowledge on animal physiology such as adaptation, respiration, circulation, excretion, osmoregulation, thermoregulation. • Advanced concept of neurobiology. • Detailed knowledge of major endocrine hormones: origin, structure, regulation of synthesis, mode of actions, physiological functions, abnormalities. • In-depth knowledge of sex hormones in the regulation of reproduction. • Concept on chronobiology and biological clock and its importance. • Hands-on training on different serological parameters with the specimen of different categories of vertebrates. • Hands-on training the identification, isolation, fixation, and rest of histological steps with mammalian endocrine glands. Skills gained: • Understanding of different physiology and the interrelations among them. • Analysis of structure and functions of hormones. Competency developed: • Will understand hormone action and inter-relationships. • Accumulate a critical mass of fundamental information and practical approaches for the diagnosis, management and prevention of endocrine disorders including endocrine disorders in children. • Acquire knowledge and skills necessary for the critical analysis of the

		endocrine literature. • To be able to persuade scholarly research in Endocrinology, Metabolism and Diabetes.
ZCT-402	**Evolution, Population Genetics and Biosystematics**	Knowledge gained • Learn the concepts pertaining to atmosphere, earth system processes, geological hazards and waste management • Introduction to environment impact assessment and environmental audit • Learn the concepts of elementary environmental chemistry and ecotoxicology • Concept on endocrine disruptors • Learn about evolution and conservation biology • Advanced concepts of applied environmental biology and environmental biotechnology • Learn the tools and techniques in environmental biology Skills gained • Learning concepts, procedure and protocols related to environmental biology Competency developed • Understanding the concepts and protocols related to environmental biology
ZET-401	**Clinical & Applied Immunology**	Knowledge gained: • Students will gain a foundation knowledge in clinical and applied immunology. • They will engage in deeper understanding of how the immune system works intricately with other system, building on their previous knowledge from cellular and molecular Immunology. Skills gained: • Be able to describe lymphocyte development and the expression of their receptors. • Be able to provide an overview of the interaction between the immune system and pathogens. • Tumor immunology • Be able to describe HLA and disease association. • Be able to describe the immunological basis of Immunodeficiency diseases including AIDS. • Understand the immunological basis of reproductive Immunology. • Be able to describe the immunological basis of Gene therapy Competency developed: • Explore strategies to improve existing vaccines and how to approach these. • Critically understand the Techniques and technologies for quantitation of immunologically relevant molecules. • Determine what immunomodulatory strategies can be used to enhance immune responses or to suppress unwanted immune responses such as might be required in hypersensitivity reactions, transplantations or autoimmune diseases. • Explore strategies to improve existing vaccines and how to approach these. • Critically review the sample literature to determine the strengths and weaknesses of the data published in immunology and try to explore novel areas by undertaking research.

ZET-402	**Environmental Biology**	Knowledge gained • Learn the concepts pertaining to atmosphere, earth system processes, geological hazards and waste management • Introduction to environment impact assessment and environmental audit • Learn the concepts of elementary environmental chemistry and ecotoxicology • Concept on endocrine disruptors • Learn about evolution and conservation biology • Advanced concepts of applied environmental biology and environmental biotechnology • Learn the tools and techniques in environmental biology Skills gained • Learning concepts, procedure and protocols related to environmental biology Competency developed • Understanding the concepts and protocols related to environmental biology
ZET-403	**Insect Pests and Management**	Knowledge gained • Development of concept about hexapod classification, different major insect orders and their major familes • Development of knowledge about major insect pests of crops, forests, stored grains etc • To develop concept about insect pest status, pest control methods, IPM strategy in different commercial crops • Development of depth knowledge about insect vector biology, disease transmission, pathogenicity, endemicity of disease and about different control measures. Skills gained: • Identification of major insect pests and vectors responsible for disease transmission • Knowing the physiology, life history in efficacious management of insect pests and vectors. • Role in pollination, aesthetic value, insect based drug and products.
ZET-404	**Fish Technology and Management**	Knowledge gained: • In-depth knowledge of different sophisticated cutting edge techniques such as craft, gears, different fish detection methods used in aquaculture and fisheries. • Detailed knowledge of the different techniques of fish preservation and processing. • Knowledge of the use of fish by-products. • Knowledge of financial matters related to fisheries and idea to develop FCS for the betterment of fisherman. • Knowledge of advanced techniques used in aquaculture and fisheries. • Knowledge of the National Fisheries Development Board, Department of Fisheries, Ministry of Fisheries, Animal Husbandry and Dairying, Govt. of India and their impact on GDP of the country. Skills gained: • Advanced techniques used in aquaculture and fisheries to increase the rate of production of the cultured as well as capture species according to the increasing demand of the market. • Trained how to utilize the natural water resource for the production

		of aquaculture based organisms. • Skilled to prepare homemade artificial fish food with in-depth knowledge of its ingredients. • Advance techniques of fish preservation and preparation of fish by-products. • Encourage to adopt as a skill for employment by performing directly as a farm owner, researcher, or even as a worker to upgrade the socio-economic status of the people. Competency developed: • Develop the ability to construct fish farm independently. • Develop the ability to research in the field of fish biology for more products in aquaculture and fisheries. • Develop the ability to work with any fishery organization/institute and opens the job opportunity there. • Develop the ability to guide (consultancy) layman individual in his/her difficulties during the construction as well as to run a fish farm.
ZET-405	**Molecular Genetics**	**Knowledge gained** • Patterns of inheritance, polygenic theory, methylation and gene regulation. • Cancer genetics and its therapy, molecular pathology. • Molecular genetics of diseases, pharmacogenetics, phermacogenomics, personalized medicines. • Genomcis and proteomics: various techniques. • Recombinant DNA techniques and gene function analysis. • Application of genetic techniques in gene mapping in disease gene. • Mutation detection assays. **Skill gained** • Advance knowledge on molecular genetics related to gene analysis and diseases. • Equipped with intensive knowledge on different old age related disorders. • Equipped with advance tools and techniques for advance analysis. **Competence Developed** • Competent to design and develop research ideas. • Can join reputed academic institutions in the relevant field for research/ Higher studies.
ZCP-401	**Animal Physiology and Endocrinology**	Knowledge gained: • In-depth analytical knowledge on animal physiology such as adaptation, respiration, circulation, excretion, osmoregulation, thermoregulation. • Advanced concept of neurobiology. • Detailed knowledge of major endocrine hormones: origin, structure, regulation of synthesis, mode of actions, physiological functions, abnormalities. • In-depth knowledge of sex hormones in the regulation of reproduction. • Concept on chronobiology and biological clock and its importance. • Hands-on training on different serological parameters with the specimen of different categories of vertebrates. • Hands-on training the identification, isolation, fixation, and rest of histological steps with mammalian endocrine glands. Skills gained: • Understanding of different physiology and the interrelations among them.

		• Analysis of structure and functions of hormones. Competency developed: • Develop the base for higher studies in the field of animal physiology and endocrinology. • Ability to understand the topic related matters/problems faced in real-life incidents.
ZEP-401	**Immunology**	Knowledge gained: • To know the principle and protocols of various immunological techniques that include study of primary and secondary antibody response in haemagglutination test, Characterization of purified immunoglobulin preparation by SDS-PAGE, test for cell mediated immune response by Measurement of MI response. PCR technique etc. Skills gained: • To be able to collect plasma and serum from experimental animal. • Determination of primary and secondary antibody titre in immunized mouse by Haemagglutination test. • Characterization of purified immunoglobulin preparation by SDS-PAGE. • PCR technique. Competency developed: • Critically estimate Haemagglutination titre. • Isolate immune-reactive cell types from immunized mouse and understand their use for experimental purpose. • Critically engage the Techniques and technologies for quantitation of immunologically relevant molecules.
ZEP-402	**Environmental Biology**	Knowledge gained • Learn the quantitative parameters in terrestrial and aquatic systems • Learn important value index • Species identification with reference to North Bengal • Learn water and soil analysis • Learn microbial culture techniques and its application Skills gained • Assessment of different tools and techniques pertaining to environmental biology Competency developed • Understanding the concepts and protocols related to environmental biology and microbiology
ZEP-403:	**Entomology**	• To determine pest density, toxicity of an insects and different aspects about insect physiology
ZEP-404	**Fisheries**	Knowledge gained: • In-depth knowledge of different sophisticated cutting edge techniques such as craft, gears, different fish detection methods used in aquaculture and fisheries. • Detailed knowledge of the different techniques of fish preservation and processing. • Knowledge of the use of fish by-products. • Knowledge of financial matters related to fisheries and idea to develop FCS for the betterment of fisherman. • Knowledge of advanced techniques used in aquaculture and fisheries. • Knowledge of the National Fisheries Development Board, Department of Fisheries, Ministry of Fisheries, Animal Husbandry

		and Dairying, Govt. of India and their impact on GDP of the country. Skills gained: • Advanced techniques used in aquaculture and fisheries to increase the rate of production of the cultured as well as capture species according to the increasing demand of the market. • Trained how to utilize the natural water resource for the production of aquaculture based organisms. • Skilled to prepare homemade artificial fish food with in-depth knowledge of its ingredients. • Advance techniques of fish preservation and preparation of fish by-products. • Encourage to adopt as a skill for employment by performing directly as a farm owner, researcher, or even as a worker to upgrade the socio-economic status of the people. Competency developed: • Develop the ability to construct fish farm independently. • Develop the ability to research in the field of fish biology for more products in aquaculture and fisheries. • Develop the ability to work with any fishery organization/institute and opens the job opportunity there. • Develop the ability to guide (consultancy) layman individual in his/her difficulties during the construction as well as to run a fish farm.
ZEP-405	**Molecular Cell Biology and Genetics**	Knowledge gained • Techniques of chromosome preparation, Chromosome Banding, Karyotype preparation. • DNA isolation from eukaryotes and prokaryotes. • Restriction digestion of Prokaryotic and eukaryotic DNA. • Electrophoretic separation of proteins. • PCR amplification of DNA, RAPD. • Bacterial transformation and cloning. Skill gained • Trained in different molecular tools and techniques used in higher researches. • Disease identification. • Association of mutation in diseases. • Equipped to design and pursue research competent to join and work in research anywhere in the country and abroad. • Equipped with knowledge of advance and sophisticated instruments used in Biological researches.
ZCC-401, 402	**Class Test**	Knowledge gained • Comprehensive understanding of the subject Skill gained • How to answer different types of questions Competency developed • Can face different competitive exams.
ZEC-401	**Dissertation / Review**	Knowledge gained • Intensive knowledge particular field and tools and techniques. Skill gained • Equipped to compile scientific resources published in journals motivated for Researches or Higher studies .

		Competence Developed • Competent to design and develop research ideas in relevant field. • Competent to appear in Competitive exams. • Competent in Oral and writing communication.
ZCV-401	**Comprehensive viva voce**	Knowledge gained • Intensive knowledge gained in every aspect of the subject Skill gained • How to face interviews where subject knowledge will be examined • How to converse during interview sessions Competency developed • Competent to face interviews where subject knowledge will be examined • Competent to converse during interview sessions