MANONMANIAM SUNDARANAR UNIVERSITY, TIRUNELVELI

UG COURSES – AFFILIATED COLLEGES **B.Sc. Zoology** (Choice Based Credit System)

(with effect from the academic year **2020-2021** onwards)

B.Sc ZOOLOGY-COURSE STRUCTURE

Sem	Pt.I / II/III IV/ V	Subject Status	Subject title	Course /paper	Contact Hrs./ Week	Credits
I	**I**	Language	Tamil/Other Language	**1**	**6**	**4**
	II	Language	Communicative English-I	**1**	**6**	**4**
	III	Core	Animal Diversity-I Invertebrata	**1**	**4**	**4**
	III	Add on Major(Mandatory)	Professional English for Life Sciences-I	**1**	**4**	**4**
	III	Major Practical-I	Animal Diversity-I Invertebrata	**1**	**2**	**1**
	III	Allied-I	Cell Biology, Genetics and Bio-Technology	**1**	**4**	**3**
	III	Allied Practical-I	Cell Biology, Genetics and Bio-Technology	**1**	**2**	**1**
	IV	Common	Environmental Studies	**1**	**2**	**2**
			Sub total	**8**	**30**	**23**
II	**I**	Language	Tamil/Other Language	**1**	**6**	**4**
	II	Language	Communicative English-II	**1**	**6**	**4**
	III	Core	Animal Diversity-II-Chordata	**1**	**4**	**4**
	III	Add on Major(Mandatory)	Professional English for Life Sciences-II	**1**	**4**	**4**
	III	Major Practical-II	Animal Diversity-II-Chordata	**1**	**2**	**1**
	III	Allied-I	Developmental Zoology, Ecology, Animal Physiology & Evolution	**1**	**4**	**3**
	III	Allied Practical-I	Developmental Zoology, Ecology, Animal Physiology & Evolution	**1**	**2**	**1**
	IV	Common	Value based education	**1**	**2**	**2**
			Sub total	**8**	**30**	**23**

III	**I**	Language	Tamil/Other Language	**1**	**6**	**4**
	II	Language	English	**1**	**6**	**4**
	III	Core	Developmental Zoology	**1**	**4**	**4**
	III	Major Practical-III	Developmental Zoology	**1**	**4**	**4**
	III	Allied-I	Cell Biology, Genetics and Bio-Technology	**1**	**4**	**3**
	III	Allied Practical-I	Cell Biology, Genetics and Bio-Technology	**1**	**2**	**1**
	III	Skilled based-core	Home aquarium	**1**	**4**	**4**
	IV	Non-Major Elective	Bee Keeping	**1**	**2**	**2**
		Common	YOGA		**2**	**2**
			Sub-total	**8**	**30**	**25**
IV	**I**	Language	Tamil/Other Language	**1**	**6**	**4**
	II	Language	English	**1**	**6**	**4**
	III	Core	Cell and Molecular Biology	**1**	**4**	**4**
	III	Major Practical-IV	Cell and Molecular Biology	**1**	**2**	**1**
	III	Allied-II	Developmental Zoology, Ecology, Animal Physiology and Evolution	**1**	**4**	**3**
	III	Allied Practical-II	Developmental Zoology, Ecology, Animal Physiology and Evolution	**1**	**2**	**1**
	III	Skilled based-core	VermiTechnology	**1**	**4**	**4**
	IV	Non-Major Elective	Public Health and Hygiene	**1**	**2**	**2**
	V	Extension Activity	NCC/NSS/YRC/YW/PE			**1**
		Common	Computer for Digital Era			**2**
			Sub-total	**8**	**30**	**26**
	III	Core	Ecology and Toxicology	**1**	**5**	**4**
	III	Core	Genetics	**1**	**5**	**4**

V	**III**	Core	Animal Physiology and Biochemistry	**1**	**5**	**4**
	III	Core	Immunology and Microbiology	**1**	**5**	**4**
	III	Major Practical- V	Ecology and Toxicology and Genetics	**1**	**3**	**4**
	III	Major Practical- VI	Animal Physiology and Biochemistry	**1**	**3**	
	IV	Major Practical- VII	Immunology and Microbiology	**1**	**2**	
		Skill based common	Personality Development	**1**	**2**	**2**
			Sub-total	**8**	**30**	**22**
VI	**III**	Core	Evolution	**1**	**5**	**4**
	III	Core	Animal Biotechnology	**1**	**5**	**4**
	III	Core	Biostatistics, Computer applications & Bioinformatics	**1**	**5**	**4**
	III	Major Elective	Sericulture	**1**	**5**	**4**
	III	Major Elective	Apiculture	**1**	**4**	**4**
	III	Major Practical- VIII	Evolution and Animal Biotechnology	**1**	**2**	**4**
	III	Major Practical- IX	Biostatistics, Computer applications & Bioinformati	**1**	**2**	
	III	Major Elective Practical- X	Sericulture and Apiculture	**1**	**2**	
			Sub-total	**8**	**30**	**24**

All practical examinations are at end of each semester
*Extra credit for extra hours
Total number of hours: 180
Total number of Credits : 142

PROGRAMME OUTCOME -ZOOLOGY

After successfully completing B**. Sc. (Zoology)** Programme students will be able to:

PO Number	PO statement
PO1	Apply the scientific knowledge in daily life and to develop scientific temper
PO2	Understand and solve the problems of relevance to society to meet the specified needs using the knowledge, skills and attitudes acquired from learning zoology.
PO3	Assess the scope of Zoology and select particular areas for further study.
PO4	Understand the issues of environmental contexts and aim for sustainable development.
PO5	Develop communicative skill and to connect people, ideas, books, media and technology.
PO6	Equip students with hands on training through various courses to enhance entrepreneurship skills.
PO7	Conduct basic scientific research and provide inputs for societal benefits.
PO8	Understand the Applied Biological sciences such as Sericulture, Apiculture, aquaculture, Vermitechnology, Home aquarium,Microbiology and Biotechnology for their career opportunities.
PO9	Apply the knowledge of Zoology to understand the complex life processes and phenomena.
PO10	Develops empathy and love towards the animals.

PROGRAMME SPECIFIC OUTCOME-ZOOLOGY

PSO Number	PO statement	PO
PSO1	To impart basic knowledge of various branches of Zoology like Cell Biology, Genetics, Physiology, Developmental Biology, Ecology, Evolution, Immunology, Microbiology, Biostatistics and Computer applications. and to understand the unity of life with the rich diversity of organisms and their ecological and evolutionary significance.	**PO1**
PSO2	To acquire basic skills in the observation and study of nature, biological techniques, experimental skills and scientific investigation.	**PO10**
PSO3	To address the socio-economical challenges related to animal sciences and to facilitate students for taking up and shaping a successful career in Zoology and its related subjects.	**PO3**
PSO4	Inculcate transformational impact on the quality of education and to inspire the students to adopt scientific temper and live with scientific values and to understand the environmental issues and aim for a sustainable environment.	**PO4**
PSO5	Communicate effectively, in a scientific context using current technology.	**PO5**
PSO6	Understand animal interactions with the environment and identify the major groups of organisms with an emphasis on animals and classify them within a phylogenetic framework.	**PO7**
PSO7	Explain the origin of life with context to the origin of eukaryotic cell , fossil records, Darwinism and Neo-Darwinism, experimental evidences	**PO3**
PSO8	Acquire knowledge on microbes, biotechnology, bioinformatics and biostatistical tools and apply it in medical and biological fields.	**PO2**
PSO9	Gains knowledge about research methodologies, effective communication and skills of problem solving methods	**PO9**
PSO10	Make the students aware of applications of Zoology and to highlight the potential of various branches of Zoology like Aquaculture, Sericulture, Apiculture and Vermitechnology, to become an entrepreneur	**PO6,PO8**

Course Outcomes –Zoology

Semester : I **Major Core I**
Name of the Course : Animal Diversity –I Invertebrata
Course code : AMZO11

CO	Upon completion of this course the students will be able to	PSO	CL
CO-1	Describe the distinguishing characteristics of the major taxa	PSO - 1	**U**
CO-2	Understand biodiversity, habitat, adaptation organization and taxonomic status of invertebrates	PSO -2	**U**
CO-3	Recall certain morphological attributes and physiological processes that are distinct and significant to each Phyla	PSO -3	**R**
CO-4	Understand the systemic and functional morphology of various groups of invertebrates	PSO -4	**U,Ap**
CO-5	Interpret the affinities, evolutionary relationships and adaptation of the major taxa and to explain their economic importance with respect to invertebrates	PSO -6	**Ap,C**

Semester : I **Major Core I**
Name of the Course : Professional English For Life Sciences –I
Course code : APLS11

CO	Upon completion of this course the students will be able to	PSO	CL
CO-1	Describe the language skills of students by offering adequate practice in professional contexts,	PSO - 1	**U**
CO-2	Understand the lexical, grammatical and socio-linguistic and communicative competence	PSO -2	**U**
CO-3	Recall students' knowledge of domain specific registers and the required language skills.	PSO -3	**R**
CO-4	Understand efficient communication and to sharpen students' critical thinking skills	PSO -4	**U**
CO-5	To make students culturally aware of the target situation	PSO -5	**U,Ap**

Semester : I **Major Practical-I**
Name of the Course : Animal diversity I - Invertebrata

Course code : AMZOP1

CO	Upon completion of this course the students will be able to	PSO	CL
CO-1	Identify and list the salient features of selected invertebrate types through the observation of both living and preserved specimens.	PSO - 1	**U**
CO-2	Apply laboratory skills including microscopy, dissection and careful observation.	PSO -2	**U**
CO-3	Assess the anatomy of few invertebrates and chordates based on the dissection.	PSO -3	**R,An**
CO-4	Apply the skill of handling animals and identification in higher studies.	PSO -4	**U,Ap**
CO-5	Record the observation.	PSO -6	**Ap,C**

Semester : I **Allied paper-I**
Name of the Course : Cell Biology, Genetics and Bio-Technology
Course code : AAZO11

CO	Upon completion of this course the students will be able to	PSO	CL
CO-1	Elucidate the structure and functions of the cell organelles .	PSO - 1	**U**
CO-2	Exemplify the concept of genetics, the principles of inheritance and the role of genes in determining characters	PSO -2	**U**
CO-3	Understand the application of the innovative technology to manipulate living organisms or parts of organisms to make products useful to human.	PSO -3	**R**
CO-4	Interpret the various genetic diseases and the factors responsible for them	PSO -4	**U,Ap**
CO-5	Understand the scope and importance of Biotechnology, Basic concepts of genetic engineering and Restriction and modification of cloning vectors	PSO -6	**Ap,C**

Semester : I **Allied Practical paper-I**
Name of the Course : Cell Biology, Genetics and Bio-Technology
Course code : AAZOP1

CO	Upon completion of this course the	PSO	CL

	students will be able to		
CO-1	Demonstrate the mounting of Giant Chromosome in Chironomous larva	PSO - 1	**U**
CO-2	Gain knowledge about simple Mendelian Triats among the students.	PSO -2	**U**
CO-3	Demonstrate the skills to explain and summarize the concepts of Cell biology, Genetics and Bio-technology.	PSO -3	**R**
CO-4	Understand the structure of cells and cell organelles in relation to the functional aspects and understanding of the working principles and applications of microscopes	PSO -4	**U,Ap**
CO-5	Gain practical knowledge on the observation of specimens and models.	PSO -6	**Ap,C**

Semester : II **Major Core II**
Name of the Course : Animal Diversity –II -Chordata
Course code : AMZO21

CO	Upon completion of this course the students will be able to	PSO	CL
CO-1	Identify the general and specific characteristics of the different classes and the organization of the representative types.	PSO - 1	**U**
CO-2	Recognize and describe the major groups of chordates	PSO -2	**U**
CO-3	Understand the diversity of Chordates and its outline systematic. Discuss their affinities and adaptations to different modes of life.	PSO -3	**R**
CO-4	Understand the unique features, taxonomy and functional morphology of different classes of chordates	PSO -4	**U,Ap**
CO-5	To infer the affinities, evolutionary relationships and adaptation of the major taxa and to explain their economic importance with respect to Chordates.	PSO -6	**Ap,C**

Semester : II **Major Core I**
Name of the Course : Professional English For Life Sciences –Ii
Course code : APLS21

CO	Upon completion of this course the students will be able to	PSO	CL
CO-1	Describe the the language skills of students by offering adequate practice in professional contexts,	PSO - 1	**U**

CO-2	Understand language for speaking with confidence in an intelligible and acceptable manner.	PSO -2	**U**
CO-3	Understand the importance of reading for life.	PSO -3	**R**
CO-4	Read independently unfamiliar texts with comprehension.	PSO -4	**R**
CO-5	Describe the language skills of students by offering adequate practice in professional contexts	PSO -5	**U,Ap**

Semester : II **Major Practical-II**

Name of the Course : Animal diversity I - Chordata

Course code : AMZOP2

CO	Upon completion of this course the students will be able to	PSO	CL
CO-1	Identify and list the salient features of selected chordates through the observation of both living and preserved specimens.	PSO - 1	**U**
CO-2	Apply laboratory skills including microscopy, dissection and careful observation.	PSO -2	**U**
CO-3	Assess the anatomy of few chordates based on the dissection.	PSO -3	**R,An**
CO-4	Apply the skill of handling animals and identification in higher studies.	PSO -4	**U,Ap**
CO-5	Record the observation.	PSO -6	**Ap,C**

Semester : II **Allied paper-II**

Name of the Course : Developmental Zoology, Ecology, Animal Physiology and Evolution

Course code : AAZO21

CO	Upon completion of this course the students will be able	PSO	CL
CO-1	Understand the sequential changes from cellular grade of organization to organ grade of organization in the development of multicellular organisms.	PSO - 1	**U**
CO-2	Study the interaction and the interdependence among environmental factors and living organisms	PSO -2	**U**

CO-3	Gain knowledge about the functional significance of various organs and organ systems of animals.	PSO -3	**R**
CO-4	Discern the evolutionary significance of the animals, origin of species and effects of mutation.	PSO -4	**U,Ap**
CO-5	Summarize the concepts of embryological development,dynamics of ecosystem,organ system functions and the theories of evolution.	PSO -6	**Ap,C**

Semester : II **Allied Practical paper-II**

Name of the Course : Developmental Zoology, Ecology, Animal Physiology and Evolution

Course code : AAZOP2

CO	Upon completion of this course the students will be able	PSO	CL
CO-1	Demonstrate the mounting and observation of live sperms of frog.	PSO - 1	**U**
CO-2	Gain practical knowledge about the estimation of dissolved oxygen in two water samples.	PSO -2	**U**
CO-3	Attain knowledge of qualitative analysis of macromolecules.	PSO -3	**R**
CO-4	Demonstrate the effect of temperature on the opercular movement of fish	PSO -4	**U,Ap**
CO-5	Impart knowledge on the observation of specimens and models	PSO -6	**Ap,C**

Semester : III **Major Core III**

Name of the Course : Developmental Zoology

Course code : AMZO31

CO	Upon completion of this course the students will be able to	PSO	CL
CO-1	explain gametogenesis, fertilization and parthenogenesis.	PSO - 1	**U**
CO-2	Describe cleavage, morphogenetic movements and gastrulation.	PSO -2	**U**
CO-3	acquire knowledge on Organizer, gradient system foetal membranes and placentation in mammals	PSO -3	**R**
CO-4	Demonstrate metamorphosis and regeneration.	PSO -4	**U,Ap**
CO-5	Discuss Nuclear cytoplasmic interaction, assisted reproductive technology and birth control measures.	PSO -6	**Ap,C**

Semester : III **Major Practical-III**
Name of the Course : Developmental Zoology
Course code : AMZOP3

CO	Upon completion of this course the students will be able to	PSO	CL
CO-1	Identify and list the salient features of embryos of chicks. embryological stages, and ecological characters of organisms through the observation of both living and preserved microbial specimens.	PSO - 1	**U**
CO-2	Apply laboratory skills including microscopy, dissection and careful observation.	PSO -2	**U**
CO-3	Assess the microscopic view of sperm,egg,blastula gastrula .	PSO -3	**R**
CO-4	Apply the skill of handling animals and identification in higher studies.	PSO -4	**U,Ap**
CO-5	Record the observation.	PSO -6	**Ap,C**

Semester : III **Skill Based Subject**
Name of the Course : Home Aquarium
Course code : ASZO3A

CO	Upon completion of this course the students will be able to	PSO	CL
CO-1	Understands the construction and maintenance of aquarium, selection , culture and breeding techniques	PSO - 1	**U**
CO-2	Gain knowledge about nutritional requirements of aquarium fishes and different kinds of feeds.	PSO -2	**U**
CO-3	Understands about species of ornamental fishes – Taxonomy and their biology .Biology of live bearers and egg layers	PSO -3	**R**
CO-4	Identifies common diseases of freshwater and marine aquarium fishes, Treatment ,Prevention and control	PSO -4	**U,Ap**
CO-5	Understands about the taxonomy and morphology of Fresh water plants and other ornamental fresh water organisms. Starts growing aquarium fishes as hobby and as business.	PSO -6	**Ap,C**

Semester : III **Non-major Elective**
Name of the Course : Bee Keeping
Course code : ANZO3A

CO	Upon completion of this course the students will be able	PSO	CL

CO-1	Describe bee biology and anatomy from the perspective of managing bees and types of bees used for apiculture	PSO - 1	**U**
CO-2	Understands the social behaviors of honey bees and associate apiculture with agricultureand pollination	PSO -2	**U**
CO-3	Identify apiary equipments and demonstrate the assembling of apiary.	PSO -3	**R**
CO-4	Discuss the importance of honey, wax and bee venom.	PSO -4	**U,Ap**
CO-5	Know the nutritive value of Honey and to consume honey as daily food and to start apiculture as a business .	PSO -6	**Ap,C**

Semester : IV **Major Core IV**
Name of the Course : Cell and Molecular Biology
Course code : AMZO41

CO	Upon completion of this course the students will be able to	PSO	CL
CO-1	Identify the different types of microscope and analyses the functions.	PSO - 1	**U**
CO-2	Identify the cell organelles and discuss their functions	PSO -2	**U**
CO-3	Explain the structural organization of chromosomes and understands special types of chromosomes and their significance.	PSO -3	**R**
CO-4	Describe the structure and functions of nucleic acids	PSO -4	**U,Ap**
CO-5	Apply the knowledge of cell biology in cancer and stem cell research and demonstrate cytological techniques	PSO -5	**Ap,C**

			CL
			U
			U
			R
			U,Ap
			Ap,C

Semester : IV **Skill Based Subject**
Name of the Course : VermiTechnology
Course code : ASZO4B

CO	Upon completion of this course the students will be able to	PSO	CL

CO-1	Discuss the classification and categories of earthworms and explain the biology of earthworm	PSO - 1	**U**
CO-2	Understands the types of earthworm and studies about the collection and preservation of earthworms.	PSO -2	**U**
CO-3	Design the methodology for vermiculture and for the production of vermicompost and vermiwash.	PSO -3	**R**
CO-4	Assess the importance of earthworms in soil fertility,medicine and pharmaceutics.	PSO -4	**U,Ap**
CO-5	Realises the Financial support extended to Vermiculture fromNGO and non NGO organisation.Prepare and market the vermicompost.	PSO -6	**Ap,C**

Semester : IV **Non-major Elective**
Name of the Course : Public Health and Hygiene
Course code : ANZO4A

CO	Upon completion of this course the students will be able to	PSO	CL
CO-1	Understand the dimensions and determinants of health and changing concepts in public health	PSO - 1	**U**
CO-2	Identify health problems of the community and to effectively utilize the tools of epidemiology for understanding diseases.	PSO -2	**U**
CO-3	Describe and realize the components of personal hygiene that are critical for public health concerns.	PSO -3	**R**
CO-4	Gain knowledge and understanding about the physical, mental and social health and also know the safer disposal of various wastes.	PSO -4	**U,Ap**
CO-5	Realize about the communicable disease epidemiology, its treatment challenges and prevention and control approaches.	PSO -6	**Ap,C**

Semester : V **Major Core-V**
Name of the Course : Ecology and Toxicology
Course code : AMZO51

CO	Upon completion of this course the students will be able to	PSO	CL
CO-1	Discuss the abiotic and biotic factors of the natural ecosystem	PSO - 1	**U**

CO-2	Identify the natural resources and its conservation	PSO -2	**U**
CO-3	Critically evaluate the environmental degradation and suggest measures for remediation	PSO -3	**R**
CO-4	Identify hazardous environmental factors and assess their effects	PSO -4	**U,Ap**
CO-5	Utilize scientific literature and database to effectively communicate aspects of toxicology	PSO -6	**Ap,C**

Semester : V **Major Core VI**
Name of the Course : Genetics
Course code : AMZO51

CO	Upon completion of this course the students will be able to	PSO	CL
CO-1	Describe the fundamental principles of genetics based on Mendelian concepts.	PSO - 1	**U**
CO-2	Gain knowledge on linkage and chromosome mapping and genetic concepts affecting society.	PSO -2	**U**
CO-3	Interpret the phenotype, genotype and karyotype and derive conclusions based on genetic data. Understands mutation and syndromes in man.	PSO -3	**R**
CO-4	Understands about genetic counselling,euthenics and eugenics.Applies the knowledge in daily life by understanding pedigree chart and genetic prognosis.	PSO -4	**U,Ap**
CO-5	Recognize and develop skills necessary for advanced study or research	PSO -5	**Ap,C**

Semester : V **Major Core-VI**
Name of the Course : Animal Physiology
Course code : AMZO52

CO	Upon completion of this course the students will be able to	PSO	CL
CO-1	Gain fundamental knowledge of animal physiology and the different organ systems of the body.	PSO - 1	**U**
CO-2	Understand about the composition of food and mechanism of digestion absorption and assimilation.	PSO -2	**U**
CO-3	Summarize the clotting mechanism and cardiac cycle and respiratory processes.	PSO -3	**R**
CO-4	Evaluate the mechanism of muscle contraction and its energetics,neural and	PSO -4	**U,Ap**

	receptor mechanisms and to enumerate various assisted reproductive technologies.		
CO-5	Demonstrate the skill of explaining and illustrating the physiology of animals	PSO -6	**Ap,C**

Semester : V **Major Core-VII**

Name of the Course : Immunology and Microbiology

Course code : AMZO53

CO	Upon completion of this course the students will be able	PSO	CL
CO-1	Provides basics knowledge about immune system and allows the student to create insight as how to improve their immune system and good health.	PSO - 1	**U**
CO-2	Understands the types of immunity, antigens-antibodies and their properties	PSO -2	**U**
CO-3	Realize the complement system, MHC's and immune responses and understands the types of hypersensitivity reactions and auto immune diseases.	PSO -3	**R**
CO-4	Understand the History & Scope of microbiology and general structure of microbes.	PSO -4	**U,Ap**
CO-5	Explain and analyze the microbes involved in food spoilage, soil microbiology and medical microbiology.	PSO -6	**Ap,C**

Sem V-Name of the Course : Ecology and Toxicology and Genetics Core Practical-V

Course code : AMZOP5

CO	Upon completion of this course the students will be able to	PSO	CL
CO-1	Identify and list the salient features of embryos of chicks. embryological stages, and ecological characters of organisms through the observation of both living and preserved microbial specimens. Demonstrate Mendelian principles in controlled experimental set ups	PSO - 1	**U**
CO-2	Apply laboratory skills including microscopy, dissection and careful observation. Identify Mendelain traits in man	PSO -2	**U**

CO-3	Assess the microscopic view of marine and freshwater planktons. Understands polygenic inheritance in man, identifies different syndromes in man.	PSO -3	**R**
CO-4	Apply the skill of handling animals and identification in higher studies. Identify own Blood group and understands the applications of blood grouping	PSO -4	**U,Ap**
CO-5	Record the observation. Design experiments, collect, analyze, interpret the data statistically and draw conclusion	PSO -6	**Ap,C**

Semester : V **Major Practical-VI**
Name of the Course : Animal Physiology
Course code : AMZO54

CO	Upon completion of this course the students will be able to	PSO	CL
CO-1	Examine and interpret the various physiological parameters.	PSO - 1	**U**
CO-2	Attain knowledge of qualitative analysis of macromolecules and excretory products.	PSO -2	**U**
CO-3	Demonstrate the effect of temperature on the opercular movement of fish and estimate the rate of Oxygen consumption in a fish.	PSO -3	**R**
CO-4	Demonstrate estimation of blood pressure using sphygmomanometer and counting of different kinds of blood cells using haemocytometer.	PSO -4	**U,Ap**
CO-5	Understand the working principle and applications of physiological instruments	PSO -6	**Ap,C**

Semester : V **Major Practical-VII**
Name of the Course : Immunology and Microbiology
Course code : AMZOP7

CO	Upon completion of this course the students will be able to	PSO	CL
CO-1	Demonstrate ABO and Rh blood grouping.	PSO - 1	**U**
CO-2	Gain practical knowledge about simple staining, gram staining and serial dilution techniques.	PSO -2	**U**
CO-3	Examine living bacteria by hanging drop method.	PSO -3	**R**
CO-4	Demonstrate counting of microbes using haemocytometer and micrometers	PSO -4	**U,Ap**
CO-5	Gain experience in preparing cultural media and understands aseptic transfer of microbes , pure culture of bacteria and cultural	PSO -6	**Ap,C**

	characteristics of Micro-organisms.		

Semester : VI **Major Core-VIII**
Name of the Course : Evolution
Course code : AMZO61

CO	Upon completion of this course the students will be able	PSO	CL
CO-1	Gain knowledge about direct observation of fossils and evolutionary important specimen by which evolutionary relationship of animal groups.	PSO - 1	**U**
CO-2	Impart knowledge regarding the various theories of evolution, evolutionary process such as variation, speciation, natural selection, origin of primates and man	PSO -2	**U**
CO-3	Understand the origin and salient features of evolution of horse and man as seen in the fossil records and the process of cultural evolution.	PSO -3	**R**
CO-4	Realises the process of variation and Sources of variability , Isolation and Isolating mechanisms.	PSO -4	**U,Ap**
CO-5	Understands the Animal distribution ,its patterns and Zoogeography of different regions.	PSO -6	**Ap,C**

Semester : VI **Major Core-IX**
Name of the Course : Animal Biotechnology
Course code : AMZO62

CO	Upon completion of this course the students will be able to	PSO	CL
CO-1	Understand the history, branches and scope of biotechnology and gene transfer technique.	PSO - 1	**U**
CO-2	Impart the Knowledge to culture animal cells in artificial media and growth of cell lines.	PSO -2	**U**
CO-3	Relate the principle of blotting, gene sequencing and micro array techniques with genome analysis.	PSO -3	**R**
CO-4	Understand the recombinant technology, gene integration into the vector and with host genome and creation of transgenic animals.	PSO -4	**U,Ap**

CO-5	Describe the applications stem cells and gene therapy and biotechnology devices.	PSO -6	**Ap,C**

Semester : VI **Major Core-X**
Name of the Course : Biostatistics, Computer Applications & Bioinformatics
Course code : AMZO63

CO	Upon completion of this course the students will be able	PSO	CL
CO-1	Define terminologies applied in biostatistics.	PSO - 1	**U**
CO-2	Collect, present and analyse biological data by appropriate statistical methods.	PSO -2	**U**
CO-3	Utilize the computer skill for biological data management,analysis and graphical presentation and develop the skill to apply statistical packages.	PSO -3	**R**
CO-4	Gain basic knowledge on computer and information technology and use appropriate programme for sequence analysis	PSO -4	**U,Ap**
CO-5	Apply bioinformatics tools for drug designing for bioinformatics research projects	PSO -5	**Ap,C**

Semester : VI **Elective-I**
Name of the Course : Sericulture
Course code : AEZO6A

CO	Upon completion of this course the students will be able to	PSO	CL
CO-1	Explain the structure, life cycle and various species of silkworm .	PSO - 1	**U**
CO-2	Describe the cultivation, harvest and preservation of mulberry leaves .	PSO -2	**U**
CO-3	Discuss the different pests infecting silkworm and their control .	PSO -3	**R**
CO-4	Relate the strategies learnt in silkworm rearing and silk thread reeling in developing silk farms.	PSO -4	**U,Ap**
CO-5	Gain the ability to explain and analyze the concepts of sericulture.	PSO -6	**Ap,C**

Semester : VI **Elective-II**

Name of the Course : Apiculture

Course code : AEZO6B

CO	Upon completion of this course the students will be able to	PSO	CL
CO-1	Attain knowledge on beekeeping and management.	PSO - 1	**U**
CO-2	Identify apiary equipments and demonstrate the assembling of apiary.	PSO -2	**U**
CO-3	Describe bee biology and anatomy from the perspective of managing bees	PSO -3	**R**
CO-4	Discuss the importance of honey, wax and bee venom.	PSO -4	**U,Ap**
CO-5	Outline the social behaviors of honey bees and associate apiculture with agriculture.	PSO -6	**Ap,C**

Semester : VI **Major Practical-VIII**

Name of the Course : Evolution & Animal Biotechnology

Course code : AMZOP8

CO	Upon completion of this course the students will be able to	PSO	CL
CO-1	Understand the animals of evolutionary significance. Understand the tools of gene manipulation and gene transfer	PSO - 1	**U**
CO-2	Gain knowledge about mimicry in animals and mutation in Peppered Moth. Demonstrate CO_2 estimation in effluent / sewage water samples	PSO -2	**U**
CO-3	Demonstrate the skill of explaining and illustrating the ideas and theories of evolution . Understand the isolation of genomic DNA technique, isolation of plasmid and isolation of Protein by PAGE	PSO -3	**R**
CO-4	Demonstrate the Gene Frequency : Hardy - Weinberg law- Probability Experiment. Understand protoplast preparation and fusion	PSO -4	**U,Ap**
CO-5	Demonstrate the process of variation in finger prints. Identify the Use of recombinant DNA technology, genetic manipulations and in a variety of industrial processes	PSO -6	**Ap,C**

Semester : VI **Major Practical-IX**
Name of the Course : Biostatistics, Computer applications & Bioinformatics
Course code : AMZOP9

CO	Upon completion of this course the students will be able to	PSO	CL
CO-1	Describe and calculate mean, median, mode, standard deviation and Co-efficient of variance using Neem leaf.	PSO - 1	**U**
CO-2	Explain and calculate correlation to infer on the given data	PSO -2	**U**
CO-3	Demonstrate the skill to explain biochemical aspects of living systems and biostatistical methods .	PSO -3	**R**
CO-4	Understand and analyze various bioinformatics tools.	PSO -4	**U,Ap**
CO-5	Gain the skill to utilize biostatistics and bioinformatics in solving problems and scientific data analysis	PSO -6	**Ap,C**

Semester : VI **Major Practical-X**
Name of the Course : Sericulture and Apiculture
Course code : AMZOP10

CO	Upon completion of this course the students will be able to	PSO	CL
CO-1	Attain knowledge on the observation of preserved specimens and instruments of sericulture .	PSO - 1	**U**
CO-2	Demonstrate the dissection of silk glands, digestive and nervous system and reproductive system.	PSO -2	**U**
CO-3	Understand the selection of mulberry leaves according to different stages and the life history of silk worm moth.	PSO -3	**R**
CO-4	Demonstrate the mounting of Legs, mouth parts and sting of honey bee.	PSO -4	**U,Ap**
CO-5	Gain practical knowledge about Queen, worker, Drone, Artificial hive,Queen excluder, smoker, honey extractor, honey, Bee comb and Comb foundation sheet.	PSO -6	**Ap,C**