

Programme

Sr. No.	Course	Duration	Intake	Syllabus		
				I	II	III
01	B.Sc. (As an Optional Subject)	3 Years	50% of total intake of B.Sc. First Year	Link	Link	Link
02	M.Sc. (Zoology)	2 Years	12 Grant-in-aid + 48 Self-financed seats totalling to 60	Link June 2023 Link	Link	
03	Ph.D. (Zoology)	As per University Regulations	As per University Regulations			

The Department offers one undergraduate Programme, one post graduate programme and a doctoral programme to the students. It also offers 'Ornamental Fish Farming' as an Add-on program to the students of the institution.

Undergraduate Program offered:

B.Sc. (ZOOLOGY)

This is 3-year program offered with zoology as one of the optionals and is on the classical as well as modern foundations in Zoology. It is at par with the undergraduate programs offered in the best academic organizations across the globe. The aim of the program is to prepare budding zoologists for higher studies and research.

Postgraduate program offered:

M.Sc. (ZOOLOGY) (Intake of 12 Grant-in-aid + 48 Self-financed seats totalling to 60)

This 2-year program offered by the Department is a world class and in-depth pedagogy in the field of Zoology. The syllabus is competitive with the best in the globe and takes into consideration the syllabi of various competitive exams. While the students are trained in all the modern branches of Zoology, they are also nurtured with equal passion in the mother branch.

Both the UG and PG programs follow semester pattern with a Choice Based Credit System (CBCS). Students are also provided with 3 specializations in the Second Year in PG program.

Doctoral Program offered:

Ph.D. (ZOOLOGY)

The Department is a research centre recognized by affiliating university for doctoral research in Zoology. The faculty of the Department supervise research in a wide variety of fields detailed in the thrust areas as following:

- Applied Parasitology
- Aquatic Biology
- Fish Biology
- Animal Physiology & Toxicology

The department has all necessary research facilities and the faculty is zealous in their research output with global perspectives which are widely published, cited and acknowledged.

B.Sc. Zoology

Programme Outcomes

1. Demonstrate understanding of, and solve major conceptual problems in, all disciplines of Zoology.
2. Solve problems by thinking methodically, independently and by drawing logical conclusions.
3. Understand the process of evolution, history and classification of major animal groups.
4. Create an awareness of the impact of animals on the environment, society, and development outside the scientific community.
5. To inculcate scientific temperament in the students and in the general community.
6. Acquaint themselves with and use modern techniques, equipment and Zoology related software.
7. Prepare for a career in Zoological Survey of India, different fishery research organizations, MNCs involved in fishing and allied industries.
8. Take up fish culture, fish processing and allied food and by-product processing industry (like bee keeping, sericulture, lac culture, pearl culture, etc.) as a profession.
9. Play an active role in Environmental awareness, animal rights organizations.

COURSE OUTCOMES

B. Sc. First Year; Semester –I

Paper-I: Biodiversity of Invertebrates

Outcome of the Course:

1. The student will be able to identify a given invertebrate upto class level.
2. Ability to understand the contribution of Invertebrates in the biodiversity index of any given habitat.
3. Ability to understand and appreciate the ecological and economic importance of invertebrates and vertebrates.
4. Ability to identify and describe external morphology and internal anatomical features of representative invertebrate species.

B. Sc. First Year; Semester –I

Paper-II: Biodiversity of Chordates

Outcome of the Course:

1. The student will be able to identify and understand the Biodiversity of Chordates.
2. Ability to understand anatomical relation between different vertebrate classes.
3. The learner will be able to understand the economic importance of Chordates.

B. Sc. First Year; Semester –II

Paper-III: Comparative Anatomy of Vertebrates

Outcome of the Course:

1. The student will be able to identify and understand comparative anatomical structure of vertebrate organ systems.
2. The learner will be able to understand the evolution of various organs and systems in the vertebrate body according to its environment.
3. Understand the plasticity of organ systems to adapt to the environment and acquire different novel forms.

B. Sc. First Year; Semester –II

Paper-IV: Comparative Anatomy of Vertebrates

Outcome of the Course:

1. The student will be able to explain the basics processes of vertebrate embryonic development.
2. Ability to describe the various steps in vertebrate development.
3. Identify and explain about the different embryonic structures.
4. Describe the functions of different extra-embryonic structures.
5. Understanding of the Assisted Reproductive Technologies.

B. Sc. Second Year; Semester –III

Paper-VI: Physiology

Outcome of the Course:

On successful completion of the course, the students will be able to

1. Monitor their blood pressure and identify blood groups.
2. Understand function and types of heart & circulatory system.
3. Appreciate the basic function of kidney, main function of nerves.
4. Acquire knowledge on the nature and functions of hormones and learn the mechanism of hormone action.
5. Learn the structure and functions of Endocrine glands.
6. Understand the structure, development and function of reproductive organs in human.

B. Sc. Second Year; Semester –III

Paper-VII: Biochemistry

Outcome of the Course:

On successful completion of the course, the students will be able to

1. Understand the chemical structure and functions of various biomolecules
2. Learn the signaling of biomolecules in cell membrane.
3. Understand the correlation between metabolism of different types of biomolecules.

B. Sc. Second Year; Semester –IV

Paper-VIII: Cell Biology and Genetics

Outcome of the Course:

On successful completion of the course, the students will be able to

1. Understand the structure and function of the cell as the fundamentals for understanding the functioning of all living organisms.
2. Understand structures and various cellular functions associated with the macromolecules found in cells.
3. Acquire knowledge of Mendelian Genetics and its Extension.
4. Graduates will be able to explain and interpret various processes, phenomena, states and evolutionary tendencies at a biological system level.

B. Sc. Second Year; Semester –IV

Paper-IX: Evolutionary Biology and Genetic Engineering

Outcome of the Course:

On successful completion of the course, the students will be able to

1. Understand the theories and concepts of evolution.
2. Learn the process of evolution in animals.
3. Understand the patterns of evolutionary changes in animals.
4. Understand the organization and functions of genetic material in the living world.
5. Understand the Recombinant DNA Technology.

B. Sc. Third Year; Semester –V

Paper-XII: Ecology and Zoogeography

Outcome of the Course:

1. Establish relationship between different groups of organisms in an ecosystem.
2. Appreciate and explain the role of plants, animals and other organisms in a habitat.
3. Evaluate effect of each group of organisms on others.
4. Identify issues with Suggest methods and approaches to improve health of an ailing ecosystem.

B. Sc. Third Year; Semester –V

Paper-XIII(A): Pisciculture

Outcome of the Course:

1. Understanding of taxonomy of fish.
2. Knowledge of feeding methods and habits of fish.
3. Knowledge of general fish anatomy and morphology.
4. Knowledge of hydro-geography of India.

B. Sc. Third Year; Semester –VI

Paper-XIV: Ethology, Biometry and Bioinformatics

Outcome of the Course:

1. Knowledge and understanding of different forms of behavior in animals.
2. Ability to explain and apply basic biometric computation methods.
3. Describe and elaborate about the different software and techniques in bioinformatics.
4. Use different biological databases to retrieve biological information.

B. Sc. Third Year; Semester –VI

Paper-XV (A): Aquaculture

Outcome of the Course:

1. Knowledge of various types of aquaculture and culture methods and Mariculture.
2. Understanding of fishery science, with a particular focus on the biology, assessment, and management of fish and invertebrate fisheries.
3. Awareness about man-made hazards to aquaculture.
4. Knowledge of role of Larvivorous fishes in relation to public health.
5. Awareness of the role of Government in aquaculture development.

Department of Zoology

M.Sc. Zoology

Programme Outcomes

1. Understand the scope of the subject of Zoology as a broad area of study and research.
2. Develop research and problem-solving attitude towards different aspects of zoology and allied subjects.
3. Prepare for a career in Zoological Survey of India, different fishery research organizations, pharmaceutical industries and MNCs involved in fishing and allied industries, animal testing, clinical research etc.
4. To train prospective research scholars for investigations and studies in the field of Fishery Science, Parasitology, Animal Physiology etc.
5. To develop entrepreneurship skills in ornamental fish culture, sericulture, apiculture, animal plastination etc.
6. To induct students into study of state public service exams, union public service exams, fishery departmental exams, forest conservation and restoration etc.

COURSE OUTCOMES

M. Sc. First Year; Semester –I

Paper I: Invertebrates: Structure and Function

Outcome of the Course:

1. Classify animals from different groups based on their features.
2. Explain the similarity and differences in structure and function of organs in different groups of animals.
3. Understanding about importance of integument and skeletal systems.
4. Compare the functional morphology different groups of invertebrates.

M. Sc. First Year; Semester –I

Paper II: Biosystematics, Taxonomy and Evolution

Outcome of the Course:

1. Classify animals from different groups based on their features.
2. Describe different taxa and elaborate on their anatomical and morphological features.
3. Identify and describe homologies between different groups of animals.
4. Identify and access taxonomic information in different online databases.
5. Describe evolutionary relationship between different taxa.
6. Explain about evolutionary distance between different taxa.
7. Infer phylogenetic information and prepare phylogenetic trees.

M. Sc. First Year; Semester –I

Paper III: Economic Zoology and Animal Behavior

Outcome of the Course:

1. Identify animal pathogenic diseases in humans and suggest remedial measures.
2. Evaluate and describe the economic impact of animals on human society.
3. Describe different culture methods relevant to aquaculture.
4. Identify and describe economically important fish and other animals.
5. Identify and explain different types of behavior patterns in animals.
6. Describe the importance of different behaviors in animal husbandry.

M. Sc. First Year; Semester –I

Paper IV (Elective): Quantitative Biology and Bio-Informatics

Outcome of the Course:

1. Describe different methods of data handling using computers.
2. Feed and tabulate raw data using computer.
3. Explain and perform data representation using digital methods.
4. Access and download relevant information from different online databases of biological information.
5. Perform basic operations of gene sequence retrieval and compare them using different software.
6. Perform basic operations of protein structure retrieval and comparison using different software.

M. Sc. First Year; Semester –I

Paper IV (Elective): Conservation Biology

Outcome of the Course:

1. Ability to describe biodiversity and its role in ecosystem health.
2. Ability to understand and analyze ecological factors affecting biodiversity.
3. Knowledge about different biodiversity hotspots of India and their unique characteristics.
4. An understanding of methods and tools used for wildlife conservation in India.
5. An understanding of and ability to interpret the Laws governing natural biodiversity in India.
6. Ability to disseminate knowledge about biodiversity in India and the significance of its conservation

M. Sc. First Year; Semester –II

Paper VI: Animal Ecology, Toxicology and Environmental Pollution

Outcome of the Course:

1. Describe the role of different gases in greenhouse effect.
2. Identify and suggest remedial measures to deal with different types of pollution.
3. Identify and describe adaptations of animals to different ecosystems.
4. Suggest and develop conservation and management strategies for a particular ecological problem.

M. Sc. First Year; Semester –II

Paper VII: Gamete Biology and Animal Development

Outcome of the Course:

1. Understand and describe the different developmental processes.
2. Describe different techniques and methods used in experimental embryology.
3. Elaborate on metamorphosis and regeneration in various and relate these processes to abnormalities in animals.
4. Identify and evaluate application of different ART techniques to different infertility conditions.
5. Describe different types of infertility in humans.

M. Sc. First Year; Semester –II

Paper VIII: Biochemistry and Immunology

Outcome of the Course:

1. Describe the structure and working of different components of vertebrate immune system.
2. Elaborate about the innate and adaptive immune responses in vertebrates.
3. Describe the different immunological disorders found in man.
4. Explain the different techniques in immunology
5. Elaborate about structure and application of antibodies in clinical therapy and biological research.

M. Sc. First Year; Semester –II

Paper IX(Elective): Tools and Techniques for Biology

Outcome of the Course:

1. Identify and describe the different equipment and tools used in a biology laboratory.
2. Correctly operate different laboratory instruments.
3. Correctly operate different types of microscopes.
4. Prepare tissue for section cutting and correctly operate a microtome.
5. Choose and perform correct staining technique for any given tissue sections.
6. Describe cellular separation techniques.
7. Properly handle and maintain glassware.
8. Properly operate laboratory equipment.

M. Sc. First Year; Semester –II

Paper IX(Elective): Pathobiology & Medical Zoology

Outcome of the Course:

1. Explain about the different pathogens causing disease in man.
2. Describe the different parasites causing disease and disability in man and animals.
3. Ability to elaborate about the life cycle and biology of disease carrying vectors; suggest preventive and control measures for the said diseases.
4. An understanding of the relationship between changes in physiology of host and progress of pathogenesis in human beings and animals.

M. Sc. Second Year; Semester –III

Paper XI: Vertebrates- Structure and Function

Outcome of the Course:

1. Able to explain the broad classification of vertebrates based on features.
2. Describe relation between organ systems in different vertebrate groups.
3. Explain the significance of integument and skeletal systems of vertebrates.
4. Compare the structural and functional morphology of vertebrates.

M. Sc. Second Year; Semester –III

Paper XII: Molecular Cell Biology

Outcome of the Course:

1. Elaborate about contemporary developments in the field of molecular biology.
2. Explain the differences between prokaryotes and eukaryotes.
3. Describe the processes of cell communication and carcinogenesis.
4. Learn about latest in gene and genome structure, functions and organization.

M. Sc. Second Year; Semester –III

Paper XIII-A: Applied Parasitology- I: Microbes and Arthropods of Medical Importance

Outcome of the Course:

1. Students are able to identify Microbes and Arthropods of medical importance.
2. Students can describe basics of microbes and arthropods of public health importance.
3. Students will be able to understand and apply the principles of controlling diseases caused by microbes and arthropods.
4. Students will be able to elucidate the Vector-Host-Pathogen relationship.
5. Students will be able to understand the basic components of the immune system and its role to protect the host against pathogens.

M. Sc. Second Year; Semester –III

Paper XIII-B: Fishery Science- I: Fish Morphology, Anatomy and Physiology- I

Outcome of the Course:

1. Explain the inter-relation between different groups of fish.
2. Be able to identify and broadly classify fish.
3. Appreciate the relation between environment and feeding and digestion in fish.
4. Describe the respiratory mechanisms in different groups of fish.
5. Explain the significance of biological rhythms in fish growth and reproduction.

M. Sc. Second Year; Semester –III

Paper XIII-D: Animal Physiology- I: General Physiology- I

Outcome of the Course:

1. To describe the different mechanisms of homeostasis in animals.
2. To elaborate about and relate the structure and functions of neurons.
3. To explain respiratory functions under conditions of high altitude and under water.
4. To explain the relation between physiology of body with physical exercise and Yoga.

M. Sc. Second Year; Semester –III

Paper XV-A: Applied Parasitology- II: Protozoans of Medical Importance

Outcome of the Course:

1. Students are able to identify Protozoans of medical importance.
2. Describe basics of Protozoans of public health importance.
3. Able to understand and apply the principles of controlling Protozoan diseases.
4. Explain about Host-Parasite relationship.

M. Sc. Second Year; Semester –III

Paper XIV-B: Fishery Science- II: Fish Morphology, Anatomy and Physiology- II

Outcome of the Course:

1. Ability to describe the structure and functions of the nervous & reproductive systems.
2. Elaborate the migration patterns, growth & age determination methods of fish species.
3. Describe the specialized organs like swim bladder, electric & acoustic organs in fish.
4. Explain the working of endocrine and venom glands in fish.

M. Sc. Second Year; Semester –III

Paper XIV-D: Animal Physiology- II: General Physiology- II

Outcome of the Course:

1. Ability to distinguish between prokaryotes and eukaryotes.
2. Trace relation between different aspects of metabolism.
3. Knowledge of different types of enzymes, their properties, functions and interactions.
4. An appreciation of energy pathways, intermediaries and dynamics in cells.

M. Sc. Second Year; Semester –IV

Paper XVI: Genetics and Genetic Engineering

Outcome of the Course:

1. Explain the principles of Mendelian inheritance.
2. Describe gene and chromosomal inheritance and their disorders.
3. Elaborate about different tools and techniques used in recombinant DNA technology.
4. Discern the different tools used in cloning and gene transfer technology.

M. Sc. Second Year; Semester –IV

Paper XVII: Mammalian Endocrinology

Outcome of the Course:

1. Appreciate the nature, functions and classification of hormones.
2. Describe general structure and functions of endocrine glands in mammals.
3. Trace the relation between pituitary and other endocrine glands.
4. Elaborate about endocrine role of adrenal, pancreatic and pineal tissue in humans.
5. Explain about functions of gastro-intestinal and reproductive hormones in humans.
6. Elaborate about the different endocrine disorders in humans.

M. Sc. Second Year; Semester –IV

Paper XVIII-A: Applied Parasitology- I- Trematodes And Cestodes

Outcome of the Course:

1. Students will understand morphology, life cycle and pathogenesis of Trematode and Cestode infections.
2. Students will be able to identify clinical signs and suggest preventive measure in parasitic infections.
3. Students will understand structure and working of immunity system and appreciate its role in resistance to parasitic infections.
4. Students will have the knowledge of endemic and national parasitic problems.

M. Sc. Second Year; Semester –IV

Paper XVIII-B: Fisheries and Fish Culture- I

Outcome of the Course:

1. Knowledge of capture and culture fishery practices of India and methods adopted.
2. Suggest design and management procedures for a fish farm.
3. Carry out artificial fish breeding and weed control in a fish farm.
4. Identify various fish diseases and suggest treatments.
5. Elaborate about different fish preservation methods.
6. Evaluate suitability of different fish for making by-products.

M. Sc. Second Year; Semester –IV

Paper XVIII-D: Mammalian Physiology- I

Outcome of the Course:

1. An understanding of digestive system structure, functions & its disorders.
2. Knowledge of respiratory system function and its pathological conditions.
3. Ability to describe circulatory system, its components, functions & diseases.
4. Appreciation of excretory system structure, functions & related disorders & their tests.

M. Sc. Second Year; Semester –IV

Paper XIX-A: Applied Parasitology- II- Animal Nematodes and Plant Nematodes

Outcome of the Course:

1. A good understanding of parasitology in general and Nematodes in particular.
2. Knowledge of plant nematology, especially of disease caused by parasitic nematodes.
3. Understanding of structural and functional organization of nematodes.
4. Knowledge of pathogenesis of plant and animal nematode parasites.
5. An understanding of methods of nematode disease prevention.
6. Knowledge of life history and ecology of larval and adult nematodes.

M. Sc. Second Year; Semester –IV

Paper XIX-B: Fisheries and Fish Culture- II

Outcome of the Course:

1. Describe the fishery resources of India.
2. Knowledge about culturable organisms and different culture methods.
3. Identify and assess the anthropogenic threats to fishery industry.
4. Knowledge of marine capture and culture fishery of India and legislative framework to regulate it.

M. Sc. Second Year; Semester –IV

Paper XIX-D: Mammalian Physiology- II

Outcome of the Course:

1. To describe and elaborate about nervous system components and their functions.
2. To outline reproductive system structure, functions, related conditions and remedies.
3. To delineate muscle structure, functioning mechanism, and disorders
4. To represent about the sensory system, their working, and disorders.

Swami Ramanand Teerth Marathwada University, Nanded

Choice Based Credit System (CBCS) Course Structure

Faculty of Science & Technology

B. Sc. First Year (Semester I & Semester II) Syllabus w.e.f. June, 2019

Semester Pattern; Subject: Zoology

Class/ Semester	Course Number		Name of the Course/ Paper	Instruction Hrs/Week	Total Periods/ Practicals	Marks for		Total Marks	Credits
						Internal (CA)	External (ESE)		
B.Sc. F.Y. Semester I	CCZ-I Biodiversity of Invertebrates and Chordates	Section -A	PAPER I: Biodiversity of Invertebrates	03	45	10	40	50	Credit:02
		Section-B	PAPER II: Biodiversity of Chordates	03	45	10	40	50	Credit:02
B.Sc. F.Y. Semester II	CCZ-II Comparative Anatomy and Developmental Biology of Vertebrates	Section -A	PAPER III: Comparative Anatomy of Vertebrates	03	45	10	40	50	Credit:02
		Section-B	PAPER IV: Developmental Biology of Vertebrates	03	45	10	40	50	Credit:02
B.Sc. F.Y. Semester I & II	CCZP-I	Section -A & Section- B	Practical Paper- V: Biodiversity of Invertebrates and Chordates & Comparative Anatomy and Developmental Biology of Vertebrates (Practical based on P-I,II,III & IV)	03	30	20	80	100	Credit:04
Total Credit for Semester I & II						60	240	300	Credit:12

CCZ: Core Course Zoology, **CCZP:** Core Course Zoology Practical, **CA:** Continuous Assessment;

ESE: End of Semester Examination,

Practical Paper CCZP-I for both semesters I & II respectively will be at the end of Academic Year in Annual Pattern.

Practical Internal Evaluation (Continuous Assessment CA)= 20 Marks

Submission of Record book, Excursion Report & slides =10 Marks; Internal Test on Practical=10 Marks

Swami Ramanand Teerth Marathwada University, Nanded

Choice Based Credit System (CBCS) Course Structure

Faculty of Science & Technology

B. Sc. Second Year (Semester III & Semester IV) Syllabus w.e.f. June, 2020

Semester Pattern; Subject: Zoology

Class/ Semester	Course Number		Name of the Course/ Paper	Instruction Hrs/Week	Total Periods/ Practicals	Marks for		Total Marks	Credits
						Internal I (CA)	External (ESE)		
B.Sc. S.Y. Semester III	CCZ-III Physiology and Biochemistry	Section –A	PAPER VI: Physiology	03	45	10	40	50	Credit:02
		Section-B	PAPER VII: Biochemistry	03	45	10	40	50	Credit:02
	CCZP-II	[CCZ III (Section A & Section B)	Practical Paper- X: Physiology and Biochemistry (Practical based on P-VI & VII)	03	30	10	40	50	Credit:02
	SECZ-I		SEC-I Any one Skill to be chosen out of Two SECZ –I (A) : Haematology SECZ –I (B) : Urinology	03	45	25	25	50	Credit:02
B.Sc. S.Y. Semester IV	CCZ-IV Cell Biology, Genetics, Evolutionary Biology and Genetic Engineering	Section –A	PAPER VIII: Cell Biology and Genetics	03	45	10	40	50	Credit:02
		Section-B	PAPER IX: Evolutionary Biology & Genetic Engineering	03	45	10	40	50	Credit:02
	CCZP-II	[CCZ IV (Section A & Section B)	Practical Paper- XI: Cell Biology, Genetics, Evolutionary Biology and Genetic Engineering (Practical based on P- VIII & IX)	03	30	10	40	50	Credit:02
	SECZ-II		SEC-II Any one Skill to be chosen out of Two SECZ –II (C): Histotechnology SECZ –II (D): Apiculture	03	45	25	25	50	Credit:02
Total Credit for Semester III & IV						110	290	400	Credit:16

CCZ: Core Course Zoology, CCZP: Core Course Zoology Practical, CA: Continuous Assessment;

ESE: End of Semester Examination, SECZ: Skill Enhancement Course Zoology

SECZ: CA-25: Seminar-15 & Test-10 ESE-25: Report Submission-10; Overall Skill Judgment-10 and Presentation-05

ESE for SECs SECZ-I & SECZ-II and Practical Papers CCZP-II & CCZP-III for both semesters III & IV respectively will be at the end of Academic Year in Annual Pattern.

Practical Internal Evaluation (Continuous Assessment CA)= 10 Marks

Submission of Record book & Excursion Report =05 Marks; Internal Test on Practicals=05 Marks

Swami Ramanand Teerth Marathwada University, Nanded
Choice Based Credit System (CBCS-R2021) Course Structure
Faculty of Science & Technology
B. Sc. Third Year (Semester V & Semester VI) Syllabus w.e.f. June, 2021
Semester Pattern; Subject: Zoology

Class/ Semester	Course Number		Name of the Course/ Paper	Instruction Hrs/Week	Total Periods/ Practicals	Marks for		Total Marks	Credits
						Interna I (CA)	External (ESE)		
B.Sc. T.Y. Semester V	DSEZ-I	Section -A	PAPER-XII- ECOLOGY AND ZOOGEOGRAPHY	03	45	10	40	50	Credit:02
		Section-B (Select Any one paper from A/B/C/D)	PAPER-XIII (A)- PISCICULTURE	03	45	10	40	50	Credit:02
			PAPER-XIII (B)- APPLIED PARASITOLOGY - I						
			PAPER-XIII (C)- ENTOMOLOGY- I						
			PAPER-XIII (D)- ENVIRONMENTAL BIOLOGY - I						
	DSEZP-I	[DSEZ I & II] (Section A)	Practical Paper- XVI-ECOLOGY,ZOOGEOGRAPHY ETHOLOGY, BIOMETRY AND BIOINFORMATICS (Practical based on P-XII & XIV)	03	30	10	40	50	Credit:02
	SECZ-III		SEC-III Any one Skill to be chosen out of Two SECZ -III (E) : PARASITES OF PUBLIC HEALTH IMPORTANCE SECZ -III (F) : VERMICULTURE AND VERMICOMPOSTING	03	45	25	25	50	Credit:02
B.Sc. T.Y. Semester VI	DSEZ-II	Section -A	PAPER-XIV- ETHOLOGY,BIOMETRY AND BIOINFORMATICS	03	45	10	40	50	Credit:02
		Section-B (Select Any one paper from A/B/C/D)	PAPER-XV (A)- AQUACULTURE	03	45	10	40	50	Credit:02
			PAPER-XV (B)- APPLIED PARASITOLOGY - II						
			PAPER-XV (C)- ENTOMOLOGY- II						
		PAPER-XV (D)- ENVIRONMENTAL BIOLOGY - II							
	DSEZP-II	[DSEZ I & II] (Section B)	Practical Paper- XVII (A)- PISCICULTURE & AQUACULTURE (Practical based on P-XIII(A)& XV (A))	03	30	10	40	50	Credit:02
		{Select Any one paper from A/B/C/D}	Practical Paper- XVII(B)- APPLIED PARASITOLOGY-I & II (Practical based on P-XIII(B)& XV(B))						
Practical Paper- XVII(C)- ENTOMOLOGY-I & II (Practical based on P-XIII(C)& XV(C))									
Practical Paper- XVII(D)- ENVIRONMENTAL BIOLOGY -I & II (Practical based on P-XIII(D)& XV(D))									
SECZ-IV		SEC-IV Any one Skill to be chosen out of Two SECZ -IV (G): AQUARIUM KEEPING SECZ -IV (H): SERICULTURE	03	45	25	25	50	Credit:02	
Total Credit for Semester V & VI						110	290	400	Credit:16

DSEZ: Discipline Specific Elective Course Zoology, **DSEZP:** Discipline Specific Elective Course Zoology Practical, **CA:** Continuous Assessment;

ESE: End of Semester Examination, **SECZ:** Skill Enhancement Course Zoology

SECZ: CA-25: Seminar-15 & Test-10 ESE-25: Report Submission-10; Overall Skill Judgment-10 and Presentation-05

ESE for SECs SECZ-III & SECZ-IV and Practical Papers DSEZP-I & DSEZP-II (A/B/C/D) for both semesters V & VI respectively will be at the end of Academic Year in Annual Pattern.

Swami Ramanand Teerth Marathwada University, Nanded
CHOICE BASED CREDIT SYSTEM (CBCS)
SEMESTER PATTERN
Faculty of Science and Technology
w. e. f. Academic Year 2019-2020
PAPER NUMBER AND TITLE OF PAPER
M.Sc. Zoology-I Year First Semester

Paper No. / Title of the Paper	Credit (Marks)			Periods
	External : ESE	Internal : CA	Total Credits (Marks)	
Theory Paper – I: Invertebrates: Structure and Function	Credit: 03 (Marks: 75)	Credit: 01 (Marks: 25) (2 Test: 15 Marks; Assignments: 10 Marks)	Credit: 04 (Marks: 100)	60
Theory Paper – II: Biosystematics, Taxonomy and Evolution	Credit: 03 (Marks: 75)	Credit: 01 (Marks: 25) (2 Test: 15 Marks; Assignments: 10 Marks)	Credit: 04 (Marks: 100)	60
Theory Paper – III: Economic Zoology and Animal Behavior	Credit: 03 (Marks: 75)	Credit: 01 (Marks: 25) (2 Test: 15 Marks; Assignments: 10 Marks)	Credit: 04 (Marks: 100)	60
*Theory Paper (Elective) – IV: Quantitative Biology and Bioinformatics <i>Or</i> Conservation Biology	Credit: 03 (Marks: 75)	Credit: 01 (Marks: 25) (2 Test: 15 Marks; Assignments: 10 Marks)	Credit: 04 (Marks: 100)	60
Theory Paper – V: Seminar <i>Or</i> **One SWAYAM – MOOCs Online Course of 2 Credits (instead of two Seminars each of Semester I and Semester II)	---	Credit: 01 (Marks: 25)	Credit: 01 (Marks: 25)	---
TOTAL	Credit: 12 (Marks: 300)	Credit: 05 (Marks: 125)	Credit: 17 (Marks: 425)	600
M.Sc. Zoology-I Year Second Semester				
Paper No. / Title of the Paper	Credit (Marks)			Periods
	External : ESE	Internal : CA	Total Credits (Marks)	
Theory Paper – VI: Animal Ecology, Toxicology and Environmental Pollution	Credit: 03 (Marks: 75)	Credit: 01 (Marks: 25) (2 Test: 15 Marks; Assignments: 10 Marks)	Credit: 04 (Marks: 100)	60
Theory Paper – VII: Gamete Biology and Animal Development	Credit: 03 (Marks: 75)	Credit: 01 (Marks: 25) (2 Test: 15 Marks; Assignments: 10 Marks)	Credit: 04 (Marks: 100)	60
Theory Paper – VIII: Biochemistry and Immunology	Credit: 03 (Marks: 75)	Credit: 01 (Marks: 25) (2 Test: 15 Marks; Assignments: 10 Marks)	Credit: 04 (Marks: 100)	60
*Theory Paper – IX: (Elective) Tools and Techniques for Biology <i>Or</i> Pathobiology & Medical Zoology	Credit: 03 (Marks: 75)	Credit: 01 (Marks: 25) (2 Test: 15 Marks; Assignments: 10 Marks)	Credit: 04 (Marks: 100)	60
Theory Paper – X: Seminar <i>Or</i> **One SWAYAM – MOOCs Online Course of 2 Credits (instead of two Seminars each of Semester I and Semester II)	---	Credit: 01 (Marks: 25)	Credit: 01 (Marks: 25)	---
TOTAL	Credit: 12 (Marks: 300)	Credit: 05 (Marks: 125)	Credit: 17 (Marks: 425)	600

(ESE: End of Semester Examination; CA: Continuous Assessment; *: Elective Paper ; ** *SWAYAM – MOOCs Online Course* - SWAYAM or Study Webs of Active- Learning for Young Aspiring Minds Programme of Ministry of Human Resource Development, Government of India. MOOCs -Massive Open Online Course)

** If one SWAYAM – MOOCs Online Course of 2 Credits is opted, then it will be covering both papers V of Semester I and Paper X of Semester II.

M.Sc. Zoology-I Year (First and Second Semester) Laboratory Course Work (Annual Pattern)

Paper No. / Title of the Paper	Credit (Marks)		
	External : ESE	Internal : CA	Total Credits (Marks)
Laboratory Course Work-I: Based on Theory Paper- I & II: (I-Invertebrates: Structure and Function; II-Biosystematics, Taxonomy and Evolution)	Credit: 03 (Marks: 75)	Credit: 01 (Marks: 25) Test on Practical=25 Marks	Credit: 04 (Marks: 100)
Laboratory Course Work-II: Based on Theory Paper- III & IV: (III- Economic Zoology and Animal Behavior; IV (Elective*)- Quantitative Biology and Bioinformatics Or Conservation Biology:)	Credit: 03 (Marks: 75)	Credit: 01 (Marks: 25) Test on Practical=25 Marks	Credit: 04 (Marks: 100)
Laboratory Course Work-III: Based on Theory Paper- VI & VII: (VI-Animal Ecology, Toxicology and Environmental Pollution; VII-Gamete Biology and Animal Development)	Credit: 03 (Marks: 75)	Credit: 01 (Marks: 25) Test on Practical=25 Marks	Credit: 04 (Marks: 100)
Laboratory Course Work-IV: Based on Theory Paper- VIII & IX: (VIII- Biochemistry and Immunology; IX (Elective*)- Tools and Techniques for Biology or Pathobiology & Medical Zoology)	Credit: 03 (Marks: 75)	Credit: 01 (Marks: 25) Test on Practical=25 Marks	Credit: 04 (Marks: 100)
TOTAL	Credit: 12 (Marks: 300)	Credit: 04 (Marks: 100)	Credit: 16 (Marks: 400)
Total Credit & Marks of M.Sc. First Year (Theory & Practical)	Credit: 36 (Marks: 900)	Credit: 14 (Marks: 350)	Credit: 50 (Marks: 1250)

(ESE: End of Semester Examination; CA: Continuous Assessment; *: Elective Paper)

Swami Ramanand Teerth Marathwada University, Nanded
CHOICE BASED CREDIT SYSTEM (CBCS)
SEMESTER PATTERN
Effective from June, 2020
Faculty of Science and Technology
M.Sc. Zoology-II Year Third Semester

Paper No. / Title of the Paper	Credit (Marks)			Periods
	External : ESE	Internal: CA	Total Credits (Marks)	
Theory Paper – XI: Vertebrates: Structure and Function	Credit: 03 (Marks: 75)	Credit: 01 (Marks: 25) (2 Test: 15 Marks; Assignments: 10 Marks)	Credit: 04 (Marks: 100)	60
Theory Paper - XII: Molecular Cell Biology	Credit: 03 (Marks: 75)	Credit: 01 (Marks: 25) (2 Test: 15 Marks; Assignments: 10 Marks)	Credit: 04 (Marks: 100)	60
<i>Students should opt any one of following specializations, which should be common for Semester III & IV</i>				
Theory Paper XIII-A : Applied Parasitology – I Microbes and Arthropods of Medical Importance <i>Or</i> Theory Paper XIII-B Fishery Science – I Fish morphology, Anatomy and Physiology – I <i>Or</i> Theory Paper XIII- C Entomology-I Insect : Structure & Function <i>Or</i> Theory Paper XIII-D Animal Physiology- I General Physiology-I	Credit: 03 (Marks: 75)	Credit: 01 (Marks: 25) (2 Test: 15 Marks; Assignments: 10 Marks)	Credit: 04 (Marks: 100)	60
*Theory Paper XIV- A Applied Parasitology – II Protozoans of Medical Importance <i>Or</i> *Theory Paper XIV-B Fishery Science – II Fish morphology, Anatomy and Physiology– II <i>Or</i> *Theory Paper XIV-C Entomology-II Insect taxonomy, Insect development and Ecology <i>Or</i> *Theory Paper XIV-D Animal Physiology- II General Physiology-II	Credit: 03 (Marks: 75)	Credit: 01 (Marks: 25) (2 Test: 15 Marks; Assignments: 10 Marks)	Credit: 04 (Marks: 100)	60
Theory Paper – XV: Seminar <i>Or</i> **One SWAYAM – MOOCSS Online Course of 02 Credits, different than any such course done in I Year (instead of two Seminars each of Semester III and Semester IV)	---	Credit: 01 (Marks: 25)	Credit: 01 (Marks: 25)	---
TOTAL	Credit: 12 (Marks: 300)	Credit: 05 (Marks: 125)	Credit: 17 (Marks: 425)	240

(ESE: End of Semester Examination; CA: Continuous Assessment; *: Elective Paper; ** *SWAYAM – MOOCSS Online Course* - SWAYAM or Study Webs of Active- Learning for Young Aspiring Minds Programme of Ministry of Human Resource Development, Government of India. MOOCSS -Massive Open Online Course).

Swami Ramanand Teerth Marathwada University, Nanded_
CHOICE BASED CREDIT SYSTEM (CBCS)
SEMESTER PATTERN
EFFECTIVE FROM JUNE, 2020
Faculty of Science and Technology
M.Sc. Zoology-II Year Fourth Semester

Paper No. / Title of the Paper	Credit (Marks)			Periods
	External : ESE	Internal: CA	Total Credits (Marks)	
Theory Paper - XVI Genetics and Genetic Engineering	Credit: 03 (Marks: 75)	Credit: 01 (Marks: 25) (2 Test: 15 Marks; Assignments: 10 Marks)	Credit: 04 (Marks: 100)	60
Theory Paper - XVII Mammalian Endocrinology	Credit: 03 (Marks: 75)	Credit: 01 (Marks: 25) (2 Test: 15 Marks; Assignments: 10 Marks)	Credit: 04 (Marks: 100)	60
<i>Students should opt for same specialization, as chosen in Semester III</i>				
Theory Paper XVIII-A Applied Parasitology – I Trematodes and Cestodes <i>Or</i> Theory Paper XVIII-B Fishery Science – I Fisheries and Fish Culture – I <i>Or</i> Theory Paper XVIII-C Entomology-I Economic Entomology <i>Or</i> Theory Paper XVIII-D Animal Physiology- I Mammalian Physiology- I	Credit: 03 (Marks: 75)	Credit: 01 (Marks: 25) (2 Test: 15 Marks; Assignments: 10 Marks)	Credit: 04 (Marks: 100)	60
*Theory Paper XIX-A Applied Parasitology – II Animal Nematodes and Plant Nematodes <i>Or</i> *Theory Paper XIX-B Fishery Science – II Fisheries and Fish Culture – II <i>Or</i> *Theory Paper XIX-C Entomology-II Agriculture Entomology and Pest Management <i>Or</i> *Theory Paper XIX-D Animal Physiology- II Mammalian Physiology – II	Credit: 03 (Marks: 75)	Credit: 01 (Marks: 25) (2 Test: 15 Marks; Assignments: 10 Marks)	Credit: 04 (Marks: 100)	60
Theory Paper - XX: Seminar <i>Or</i> **One SWAYAM – MOOCs Online Course of 2 Credits, different than any such course done in I Year (instead of two Seminars each of Semester III and Semester IV)	---	Credit: 01 (Marks: 25)	Credit: 01 (Marks: 25)	---
TOTAL	Credit: 12 (Marks: 300)	Credit: 05 (Marks: 125)	Credit: 17 (Marks: 425)	240

(ESE: End of Semester Examination; CA: Continuous Assessment; *: Elective Paper ; ** *SWAYAM – MOOCs Online Course - SWAYAM* or Study Webs of Active- Learning for Young Aspiring Minds Programme of Ministry of Human Resource Development, Government of India. **MOOCs** -Massive Open Online Course).

** If one SWAYAM – MOOCs Online Course of 2 Credits is opted, then it will be covering both papers XV of Semester III and Paper XX of Semester IV.

**M.Sc. Zoology-II Year (Third and Fourth Semester) Laboratory Course Work
(Annual Pattern)**

Paper No. / Title of the Paper	Credit (Marks)		
	External: ESE	Internal: CA	Total Credits (Marks)
Laboratory Course Work- V: Based on Theory Paper- XI & XII (XI- Vertebrate: Structure and Function; XII- Molecular Cell Biology)	Credit: 03 (Marks: 75)	Credit: 01 (Marks: 25) Test on Practical=25 Marks	Credit: 04 (Marks: 100)
Laboratory Course Work- VI: Based on Theory Paper- XVI & XVII (LC XVI – Genetics and Genetic Engineering; LC XVII – Mammalian Endocrinology)	Credit: 03 (Marks: 75)	Credit: 01 (Marks: 25) Test on Practical=25 Marks	Credit: 04 (Marks: 100)
*Laboratory Course Work- VII: Based on Theory Paper- XIII, XIV, XVIII & XIX (A/B/C/D)	Credit: 03 (Marks: 75)	Credit: 01 (Marks: 25) Test on Practical=25 Marks	Credit: 04 (Marks: 100)
*Laboratory Course Work- VIII: Project Work	Credit: 03 (Marks: 75)	Credit: 01 (Marks: 25) Test on Project=25 Marks	Credit: 04 (Marks: 100)
TOTAL	Credit: 12 (Marks: 300)	Credit: 04 (Marks: 100)	Credit: 16 (Marks: 400)
Total Credit & Marks of M.Sc. Second Year (Theory & Practical)	Credit: 36 (Marks: 900)	Credit: 14 (Marks: 350)	Credit: 50 (Marks: 1250)

(ESE: End of Semester Examination; CA: Continuous Assessment; *: Elective Paper)