As Per NEP 2020

S. Z. S. P. Mandal's
Shri Pancham Khemraj Mahavidyalaya,
Sawantwadi-416510
(Autonomous)
Affiliated to University of Mumbai

Title of the Programme Science

B.Sc. (Zoology)

1. F.Y.B.Sc. 2026-2027
2. S.Y.B.Sc. 2027-2028
3. T.Y.B.Sc. 2028-2029

Syllabus for

Semester I
and
Semester II

Reference: GR dated 16th May 2023 for Credit structure

University of Mumbai

S. Z.S. P. Mandal's

SHRI PANCHAM KHEMRAJ MAHAVIDYALAYA

SAWANTWADI

(An Autonomous College)

DIST: SINDHUDURG- 416 510, MAHARASHTRA

DEPARTMENT OF ZOOLOGY

Syllabus for Approval

Sr. No.	Heading	Particulars
1.	Title of the Course	F. Y. B. Sc. ZOOLOGY (MAJOR COURSE)
2.	Eligibility for Admission	12th Science of all recognized Board
3.	Passing Marks	40%
4.	Ordinance/Regulations (if any)	-
5.	No. of Years/Semesters	Two Semesters
6	Level	UG
7	Pattern	Semester (60:40)
8	Status	Revised
9	To be implemented from Academic Year	From Academic Year 2026-2027

Date: 8/12/2025

Signature
HoD,
Dept. of Zoology

S.Z.S.P. Mandal's

SHri Pancham Khemraj Mahavidyalaya, Sawantwadi

(Autonomous)

Sr. No.	Name	Category	Designation	Signature
1	Dr. Ganesh Sambhu Margaj	12.5 (1)	HoD/Chairman	
2	Dr,Urmila Dnyndev Mestry	12.5 (2)	Member	
3	Dr. Mrs Shalaka Ramesh Walawalkar		Member	
4	Dr. Ravina Chandrashekhar Gawas		Member	
5	Miss.Shweta S.Jadhav		Member	
6	Miss. Tanvi Digambar Naik		Member	
			Member	
			Member	
			Member	
			Member	
			Member	
7	Dr. Sunil. Madhukar Gaikwad		Member	
8	Dr. Manoj Maruti Ghughuskar	12.5 (3)	Member	
			Member	
9	Dr. Surekha Manoj Gupta		Member	
		12.5 (4)	Member	
			Member	
10	Dr. Narsinh L. Thakur		Member	
		12.5(5)	Member	
11	Dr. Darshana Subhash Korgaonkar	12.5 (6)	Member	
12	Mr.Mangesh Suhas Mangaonkar	12.5 (7)	Member	

Sr. No.	Headings	Particulars
1	Title of the Program	**Science- Zoology**
2	Eligibility	H.S.C. with Science Stream
3	Duration of the Programme	1- Certificate 2- Diploma 3- Degree 4- Degree (Hons)
4	Scheme of Examination	60 External : 40 Internal Separate passing in External and Internal examination
5	Standard of Passing	40.00%
6	Programme Academic Level	4.5 Certificate 5.0 Diploma 5.5 Degree 6.0 Degree (Hon.)
7	Pattern	Semester Pattern
8	Status	New
9	To Be Implemented from the academic year	4.5 Certificate **2026-2027** 5.0 Diploma **2027-2028** 5.5 Degree **2028-2029** 6.0 Degree(Hon.) **2029-2030**

PREAMBLE:

S. P. K. Mahavidyalaya, Sawantwadi (Autonomous) believes in implementing several measures to bring equity, efficiency and excellence in higher education system in conformity to the guidelines laid down by the University Grants Commission (UGC). In order to achieve these goals, all efforts are made to ensure high standards of education by implementing several steps to enhance the teaching-learning process, examination and evaluation techniques and ensuring the all-round development of learners.

1) **Introduction**

The FYBSc Zoology syllabus (Under Graduate Certificate in Zoology) is designed as per the objectives and guidelines of National Education Policy 2020. This programme is designed to provide a basic understanding of the principles of life processes, evolution of life, animal behaviour, ecology and laboratory techniques through an academic curriculum of theory and practical courses. We aim to provide not only subject knowledge but also make the learners understand the core values of the Zoology. This syllabus is framed to equip learners with a basic theoretical and practical knowledge for developing analytical abilities for problem solving, exploring opportunities, and also to develop entrepreneurship skills. There will be continuous evaluation of learners based on both practical skills and theoretical / mental abilities trough class tests, group engagement and assignments.

2) **Aims and Objectives**

The aims and objectives of the FYBSc Zoology (Under Graduate Certificate in Zoology) curriculum is to provide learners with a basic understanding of the principles of life processes, evolution of life, animal behaviour, ecology and laboratory techniques, developing applications of knowledge Zoology for academic and entrepreneurial pursuits. The aims and objectives align with broader educational goals, focusing on academic and professional goals. The syllabus aims in imparting knowledge related to animal sciences, current trends and advancements in the field to develop entrepreneurial aptitude and skills.

3) **Learning Outcomes**

The learners will develop an understanding of fundamental principles of life processes, evolution of life, ecological interactions, and animal behavior and acquire laboratory skills for applications in allied industries, research, and academia. The learners will develop an aptitude for exploring the opportunities for self-employment and entrepreneurship activities.

4) **Any other point (if any)**

The skills and knowledge acquired through this programme will make the learners well- equipped for exploring the diverse fields of Zoology and applying them to entrepreneurial activities or higher academic pursuits.

OBJECTIVES:

- To help learners in developing a scientific attitude through the Zoology curriculum that involves basic and core areas of Zoology along with the recent scientific and technological advancements in applied areas of Zoology To enhance knowledge of Zoology through tutorials

and seminars

- To develop practical skills in Zoology using a range of a activities such as projects in experimental Zoology, study tours, Field visits, industrial and research institutes visits.
- To inculcate a research attitude by involving learners in simple research projects review of research articles/papers, participation in scientific events etc.
- To help learners in developing analytical abilities and skills so as to address real world problems

- To help learners to plan a progressive and successful career in Zoology, education and industry.

Program Outcome: After successful completion of this programme learners will be able to

- Develop the knowledge of basic concepts of different branches of science required for postgraduate studies.
- Inculcate the skills useful in science laboratories for pursuing jobs in Industries.
- Introduce learners to the concepts useful for environment protection.
- Follow interdisciplinary approach for developing scientific temperament.
- Identify, formulate and analyze scientific problems and reach concrete solutions for societal benefits.

Program Specific Outcome: After successful completion of this programme (Zoology)learnersare able to

- Develop the knowledge of basic concepts in Zoology
- Inculcate the skills useful in Zoology laboratory.
- Introduce learners to the applied Zoology needs and concepts.
- Identify, formulate and analyze scientific problems and reach concrete solutions for societal benefits using various principles of Zoology.
- Acquire & explore essential skills to succeed in various Zoology fields.
- Get a hold on higher educational opportunities like post-graduation in Zoology
- Pursue higher studies in interdisciplinary areas such as biochemistry, genetics, pathology.
- Explore research areas in Zoology and related fields.

F.Y.B.Sc. Zoology (USZO) Course Structure

SHri Pancham Khemraj Mahavidyalaya, Sawantwadi(Autouomous)
Proposed First Year Curriculum as per NEP 2020
Department of Zoology
Proposed Structure for Major / Minor/OE/VSE/SEC/VEC/IKS/VEC

Semester	Paper Code	Paper Title	Type	Credits
I (Level 4.5)	**USZOT101 (Major-1)**	Life Processes	**Theory**	**2**
	US ZOP 102 (Major)	Practical's based on USZOT101	**Practical**	**2**
	USZOVS103 (VSC)	Ornamental fish Breeding and maintenance	**Voc. Skill**	**2**
	USZOSE104 (SEC)	Aquarium Management	**Skill Enh.**	**2**
	USZOIKS105 (IKS)	Apiculture and sericulture	**Theory**	**2**
	USZOVEC106 (VEC)	Environmental Zoology	**Theory**	**2**
	USZOT107 (Major-2)	Ecology and Biodiversity	**Theory**	**2**
	USZOP 108 (Major-2)	Practical based on Major 2	**Practical**	**2**
II (Level 4.5)	**USZOVS109(VSC)**	Apiculture	**Practical**	**2**
	USZO SEC 110 (SEC)	Fish Value added Products	**Practical**	**2**
	USZO OE111(OE)	Wildlife Conservation	**Generic Ele.**	**2**
				2

Title of the Programme – B.Sc. Zoology

Letter Grades and Grade points

Semester GPA/Program CGPA/Semester Program	Percentage of Marks	Alpha- sign / letter grade result
9.00-10.00	90.0-100	**O** (Outstanding)
8.00-<9.00	80.0-90.0	**A+** (Excellent)
7.00-<8.00	70.0-80.0	**A** (Very Good)
6.00-<7.00	60.0-70.0	**B+** (Good)
5.50-<6.00	55.0-60.0	**B** (Above Average)
5.00-<5.50	50.0-55.0	**C** (Average)
4.00-<5.00	40.0-50.0	**P** (Pass)
Below <4.00	Below 40.0	**F** (Fail)
AB (absent)		Absent

DEPARTMENT OF ZOOLOGY

Syllabus

F. Y. B. Sc. Major Zoology

Structure of the Course:

The structure of major courses (with codes) for Semester -I and II for F.Y. B.Sc. (Zoology) NEP-2020 is given below MAJOR SUBJECTS

Semester	Course Code	Course title	No of Credits	No of Lectures In Hours
I	**USZOT101 (Major-1)**	Life Processes	**2**	**30**
	US ZOP 102 (Major)	Practical's based on USZOT101	**2**	**30**
	USZOVS103 (VSC)	Ornamental fish Breeding and maintenance	**2**	**60**

Syllabus B.Sc.

(Zoology) (Sem.- I)

Name of the course: MJ1: Life processes Course Objectives (CO):

CO1. To develop the understanding of learners about the basic of life processes including locomotion, respiration, reproduction, excretion, circulation, and nutrition.

CO2. To develop understanding of learners about coordination in life processes of the living organism.

Course Outcomes (OC):

Upon completion of the course, the learners should be able to:

OC1. Describe the co-ordination of physiological processes in organisms, including transport systems and responses to stimuli

OC2. Apply detailed knowledge to explain the processes by which organisms develop, move, breath and excrete.

Paper-1

MJ1: Life Processes

Course Code- USZOT101

Module 1: Life Processes-I	15Hr
1.1 Movement and locomotion 1.1.1 : Amoeboid movement, tube feet, flagellum 1.1.2 : Ultra-structure of cilia and ciliary movements 1.1.3 : Action of muscles (Role of muscles in movement)	03Hr
1.2 Nutrition 1.2.1 Types of nutrition: Autotrophic and Heterotrophic. 1.2.2. **Apparatus for nutrition**: 1.2.2.1 Animals without alimentary canal, ex. Amoeba 1.2.2.2. Animals with incomplete alimentary canal, ex. Hydra, Earthworm 1.2.2.3. Animals with complete alimentary canal, ex. ruminants and non- ruminants 1.2.3 Brief account of physiology of digestion in vertebrates and symbiotic digestion in Ruminants.	05Hr

1.3 Respiration 1.3.1 Aerobic and anaerobic respiration **1.3.2 Types of respiratory surfaces**: 1.3.2.1 General body surface: Cell membrane - ex. Amoeba, 1.3.2.2 Skin - ex. Earthworm and Frog 1.3.2.3 Trachea and spiracles, 1.3.2.4 Gills of fish, 1.3.2.5 Lungs of Human.	**04Hr**
1.4 Circulation 1.4.1 Types of circulating fluids: 1.4.1.1 Water, 1.4.1.2 Coelomic fluid, 1.4.1.3 Lymph and 1.4.1.4 Blood 1.4.2 **Types of circulation** 1.4.2.1 open and closed circulation, 1.4.2.2 single and double circulation. 1.4.3 **Hearts Types**, 1.4.3.1 Heart of Cockroach 1.4.3.2 Heart in chordates (2, 3 and 4 chambered heart)	**03Hr**

Module 2: Life Processes-II	**15 Hr**
2.1 Excretion and osmoregulation 2.1.1 Concepts of osmoregulation and excretion. 2.1.2 Categorization of animals on the basis of principle nitrogenous excretory products.	**4Hr**
2.2 Control and Coordination 2.2.1 Irritability in Paramoecium 2.2.2 Structure of neuron, 2.2.3 Conduction of nerve impulse 2.2.4 Endocrine regulation: 2.2.4.1 Hormones as chemical messengers,	**5 Hr**

2.3 Reproduction **2.3.1 Asexual Reproduction**: 2.3.1.1 Binary fission in Paramoecium, 2.3.1.2. Gemmule in Sponges, 2.3.1.3. Budding in Hydra, 2.3.1.4. Regeneration in planaria, **2.3.2 Sexual mode of reproduction** 2.3.2.1 Gametogenesis, 2.3.2.2 structures of Mammalian Ovum 2.3.2.3 Structure of Mammalian Spermatozoa	**3Hr**
2.4 Fertilization: 2.4.1 External and internal fertilization 2.4.2 Oviparity, 2.4.3. Viviparity 2.4.4 Ovo-viviparity	**3Hr**

Reference Books

1. Campbell Biology, 11th Ed. (2017) Lisa Urry et al. Pearson Publication. ISBN. 978-0134093413
2. Biology (1994) by John W. Kimball, 6th Ed. ISBN. 978-0697142573
3. Invertebrate Zoology: A functional and evolutionary approach. 7th Ed. (2006) Robert D Barns. ISBN: 978-8131501047.
4. Modern Textbook of Zoology Vertebrates. (2020) 4th Ed. R L Kotpal. Rastogi Publication. ISBN: 978-9350780954
5. Modern Textbook of Zoology Invertebrates (2020) 12th Ed. R L Kotpal. Rastogi Publication. ISBN: 978-8193887554.
6. Embryology (2017) Mohan P Arora. Himalaya Publishing House. ISBN: 978-9352730964.

Major Practical-1

Name of the Course: MJP1: Practical based on MJ1 Course Objectives

(CO):

CO1. To upgrade the skill in handling of basic laboratory instruments.

CO2. To enhance learners' skills in calibration of instruments and calculation techniques.

CO3. To upgrade the skill of learners in minimization of Error minimization in the laboratory.

CO4. To upgrade the skill good laboratory practices.

Course Outcomes (OC):

Upon completion of the course, the learners should be able to:

OC1. Safely practice, basic laboratory procedures and protocols inside a laboratory

OC2. Acquire the skills of basic calibration and handling of instrumentation in laboratory.

OC3. Appreciate the basics of life process in animals and their coordination in animal body.

OC4. Acquire skills for preparation of various solutions required in experimental research.

FYBSc SEM-I

Major Practical-1

Course Code- US ZOP 102

Name of the Course: MJP1: Practical based on MJ1

1. Study of *Paramoecium* culture to observe food vacuole, contractile vacuole and ciliary movement.
2. Study of nutritional apparatus: Amoeba, L.S. of Hydra, Digestive system of Cockroach, Fish, Bird, and Mammals (ruminant and non-ruminant).
3. Study of effect of pH and temperature on amylase/ trypsin activity.
4. Study of heart of Cockroach, Fish, Frog, *Calotes*, Crocodile and Mammal.
5. Excretory apparatus in Amoeba, Planaria, Earthworm, Cockroach and Fish, Mammal.
6. Study of Reproductive system in Ameoba, Hydra, Planaria, Cockroach, Mammals (T.S Testes and T.S ovary).
7. Study of respiratory apparatus in Amoeba, Cockroach, Spider, Fish and Frog, Mammal.
8. Introduction to basic laboratory safety practices, precautions and safety rules and symbols.
9. Use of Fire extinguisher,
10. Precaution and first aid for acid burn,
11. Precaution and first aid of chemical inhalation and the accident
12. Study of compound microscope, care and functions of its components,
13. Handling of common laboratory equipment (instrument and glassware): burner, autoclave, burette, and pipette (analytical and serological.
14. Handling of weighing Balance and preparation of solution of different concentration (Percentage, ppm, molarity, normality).
15. Packaging and autoclaving of test tubes, pipettes, Petri plates, and conical flask.
16. Measurement of pH of Milk, aerated drinks, Lemon juice, etc. using pH paper and pH meter.
17. Demonstration of aseptic transfer of liquids between burners.
18. Visit to clinical lab/ pathology lab, OR Central Instrumentation facility OR R & D center, and submission of report OR Participation in an Instrumentation workshop.

(Additional activity which the center may consider: Fractionation of tissue extract / cellular extract by centrifugation.)

Reference Books

1. A course in electronic measurements and instrumentation. (2015) A K Sawhney Dhanpat Rai and Co. Pvt Ltd. ISBN: 978-8177001006
2. Wilson And Walker's Principles And Techniques Of Biochemistry And Molecular Biology. 8th Ed. ISBN: 978-1316614761.
3. An Introduction to Practical Biochemistry. (2017) David Plummer. 3rd Ed. McGraw HillEducation. ISBN: 978-0070994874.
4. Bioinstrumentation. (2019) Bhawana Pandey and MH Fulekar. Dreamtech Press ISBN: 978-9389520286.
5. Guidelines for good laboratory practices-Indian council of medical research, New Delhi (2008).
7. Invertebrate Zoology: A functional and evolutionary approach. 7th Ed. (2006) Robert D Barns. ISBN: 978-8131501047.
8. Modern Textbook of Zoology Vertebrates. (2020) 4th Ed. R L Kotpal. Rastogi Publication. ISBN: 978-9350780954
9. Modern Textbook of Zoology Invertebrates (2020) 12th Ed. R L Kotpal. Rastogi Publication. ISBN: 978-8193887554.
10. Embryology (2017) Mohan P Arora. Himalaya Publishing House. ISBN: 978-9352730964.
11. Comparative anatomy of vertebrates (2008) R. K. Saxena, Sumitra Saxena. ISBN: 978-1905740994.

FYBSC SEM-I

Practical (VSC)

Course Code- USZOVS103

Name of the Course: VSC1a: Ornamental fish Breeding and maintenance

Course Objectives (CO):

CO1. To introduce learners to the fundamental concepts of ornamental fish species identification and classification.

CO2. To provide knowledge of breeding methodologies and the factors influencing successful reproduction in ornamental fish.

CO3. To impart skills in designing and managing suitable habitats for various ornamental fish species.

Course Outcomes (OC):

Upon completion of the course, the learners should be able to:

OC1. Understand the diverse species of ornamental fish and their specific care requirements.

OC2. Apply various breeding techniques to successfully propagate ornamental fish.

OC3. Demonstrate proficiency in maintaining optimal aquatic environments for ornamental fish.

Module-1: Ornamental fish Breeding and maintenance

1. Identification of ornamental fishes (freshwater and marine).
2. Breeding set up for live bearers (Guppy, swordtail, molly)
3. Breeding set up for egg bearers (Egg scatters goldfish, zebra fish, Egg depositors -Discus, Egg barriers- Killi fish, Mouth breeders-Arowana, Nest builders- Gourami, Siamese fighter)
4. Setting of rearing and breeding tank.
5. Estimation of water parameters-pH, DO, CO_2 and Salinity
6. Experiment: Study of separation of fries from parents
    1. Selecting the Right Time
    2. Using a Breeding Trap
    3. Separate Tank or Nursery Tank
    4. Using a Siphon
    5. Providing Hiding Places in the Nursery Tank
    6. Monitoring and Feeding
    7. Gradual Introduction to Larger Tank
7. Record behaviours (swimming patterns, schooling behaviour, changes in coloration, and interactions with other fish) in ornamental Fish.
8. Study of diseases and its prevention during fish breeding.
9. Assignment on breeding of an ornamental fish species (e.g. Siamese fighter, guppy, etc.).
10. Visit to a fish breeding centre / facility / aquarium shop.
11. Feasibility report for setting up an ornamental fish breeding facility.
12. Case study - Hatchery and nursery management of ornamental fishes.
13. Additional practical as per the center's requirement / facility available.

Reference Books

1. Emmens, C. W. (2013). Keeping and breeding aquarium fishes. Academic Press.
2. Dholakia, A. D. (2009). Ornamental fish culture and Aquarium management. Daya Publishing House.
3. Sinha, A., & Pandey, P. K. (2023). Breeding and Culture of Freshwater Ornamental Fish. CRC Press.
4. Dey, V.K., 1993. Ornamental fishes. Marine Products Export Development Authority, Kochi. pp.7-10.
5. Dey, V.K., 2008. Global Trade in Ornamental Fish: Trends, Prospects and Issues. Abstract, International seminar on Ornamental fish breeding, farming and trade, Cochin, India. pp.2.
6. Petrovicky, I., 1993. Tropical Aquarium Fishes. Chancellor press, London. p.258.
7. Beaven C.R., Hand Book of Fresh Water Fishes of India. Narendra Pub. House.
8. C.B.C. Srivastava. Fish Biology. Narendra Pub. House

SEMESTER- I

Skill Enhancement Course (SEC) Course

title:- Fish-

Course code :- USZOSE104

Skill Enhancement Course (SEC)

Name of the Course: SEC1: Aquarium Management

Course Objectives (CO):

CO 1. Develop entrepreneurial skill in aquarium management. CO 2. Enhance professional skill with proper scientific knowledge.

CO 3. Acquaint learners to practical skills of aquarium management .

Course Outcomes (OC):

Upon completion of the course, the learners should be able to: OC 1. Work as aquarium maintenance professional.

OC 2. Generate source of employment.

OC 3. Construct and set aquarium for ornamental fishes. OC 4. Disease management of ornamental fish.

Module: Aquarium Management

1. Types of aquariums: Freshwater (warm water, cold water), nano, marine, reef tank.
2. Accessories/equipment used in aquarium: Filters (mechanical, biological, chemical), Aerator, Heater, Thermometer, Lights, protein skimmer.
3. Identification of freshwater ornamental fishes: Guppy, Molly (*Poecilia* sps.), Goldfish (*Carassius auratus auratus*), Oscars (*Astronotus ocellatus*), Asian arowana (*Scleropages formosus*), Siamese fighting fish (*Betta splendens*), Zebra fish (*Danio rerio*), Reticulated loach (*Botia lohachata*), Dwarf gourami (*Trichogaster lalius*), Denison barb (*Sahyadria denisonii*), and Rosy Barb (*Puntius conchonius*)
4. Identification of marine ornamental fishes: Yellowtail damselfish (*Chrysiptera parasema*), Royal Gramma (*Gramma loreto*), Powder Blue Tang (*Acanthurus leucosternon*), Ocellaris Clown Fish (*Amphiprion ocellaris*), Blue Devil (*Paraplesiops meleagris*), and Butterfly fish (*Chaetodon* sps).
5. Types of plants: Vallisneria, Hydrilla, Azolla, Pistia, Sagittaria, Amazon Sword, *Limnophila*, *Limnophila aquatica*, *Ceratophyllum*, *Chara*,
6. Live fish feed: Infusoria, Rotifers, Artemia, Cladocerans, Tubifex worms, Chironomid Larvae (Blood worm),
7. Preparation of formulated fish feed.
8. Symptoms and treatment of fish diseases: Parasitic/Protozoa: Whit spot diseases, costiasis, whirling disease, Trichodiniasis; Bacterial: Bacterial gill rot, Dropsy, Ulcer disease, Furunculosis, Vibriosis, Columnaris, and Fish T.B.; Fungal- Saprolegniasis, Brachiomycosis, Ichthyophonosis.
9. Estimation of ammonia and pH of aquarium water.
10. Determination of hardness of water.
11. Determination of dissolved oxygen of water.
12. Determination of salinity.
13. Assignment on setting of freshwater and / or marine aquarium.
14. Report Submission: Visit to aquarium fish keeping entrepreneur.
15. Submission of feasibility report or budget for setting up an aquarium fish farm.

Reference Books

1. Amita Saxena (2009). Aquarium Management-Daya Publishing House, New Delhi
2. Nandita Singh, Surekha Gupta and Geeta Joshi (2023). Aquarium and its Management-AkiNik Publication, New Delhi
3. Dholakia A.D. (2016). Ornamental Fish Culture and Aquarium Management, Daya Publishing House, New Delhi
4. Taylor J.E. (2018). The Aquarium: Its Inhabitants, Structure, and Management- Unikum Verlag.
5. Mundy Obilor Jim (2015). Aquarium Making, JimArts Publishing, Norway
6. Tappan Frank (2016). Aquaria Fish, Createspace Independent Publishing Platform
7. Untergasser Dieter (1992). Handbook of fish disease, T.F.H. Publication.
8. Arumugam N. (2014). Aquaculture and Fisheries, Saras Publication, New Delhi.
9. Alderton David (2003). Freshwater Aquarium, Fox Chapel Publishing.
10. Dawes John (2001). Complete Encyclopaedia of the Freshwater Aquarium, Firefly Books.
11. Pawar Prabhakar (2013). A Complete Guide to Setting Up and Maintenance of an Aquarium, Lap Lambert Academic Publishing GmbH KG

SEMESTER I

Indian Knowledge System (IKS)

Course Title:- Indian Economic Zoology

Course Code :- USZOIKS105

IKS COURSE CODE	COURSE TITLE	UNIT	TOPICS	CREDITS	NO. OF LECTURES
ZOIK-101	**Indian Economic Zoology**	1	Apiculture	**2**	**30**
		2	Sericulture		

Course Objectives:

- To provide knowledge about apiculture, sericulture and lac culture to the students.
- To acquire the knowledge and improve required skills in Honeybee, silkworm and lac insect rearing in the students .
- To apply the knowledge about diseases in Honeybee, silkworm and lac insect .
- To apply information about apiculture , sericulture and lac culture in students.

Course Outcomes:

On completion of this course, learners will be able to:

CO1: Define, comprehend, scope and significance of apiculture, sericulture and lac culture

CO2: They can identify species of honey bees silkworm and lac insect .

CO3: Acquire the knowledge on apiculture , sericulture and lac culture and experience better to rare honeybees , silkworm and lac insects.

CO4: Apply the knowledge on lifecycle of . honeybees , silkworm and lac insects

CO5: Apply information and practical experience in rearing of . honeybees, silkworm and lac insects.

Course Contents:

Unit	Description	Lectures
I	**Apiculture**	**(15Hr)**
	1. 1Introduction , brief history and importance of Apiculture	**03Hr**
	1.2 Methods of Bee-keeping and management	**03Hr**
	1.3 Introduction to different species of Honey bees use in apiculture	**03Hr**
	1.4 Advantages and dis advantages of traditional and modern methods of apiculture	**03Hr**
	1.5 Pest , Bees enemies and diseases	**03Hr**
	1.6 Economic importance of Apiculture	

II	**Sericulture** 2.1 Introduction and scope of Sericulture 2.2 Variety of silkworm and host plants. 2.3 Life history and rearing of ***Bombyx mori*** 2.4 Harvesting and processing of cocoon 2.5 Reeling and extraction of silk 2.6 Disease and control measures. 2.7 Economic importance of Sericulture.	**(15Hr)** **03Hr** **03Hr** **03Hr** **03Hr** **01Hr** **01Hr** **01Hr**

SEMESTER I
VEC-Value education Course

Course Title:- Environmental Zoology

Course Code :- USZOVEC106

IKS COURSE CODE	COURSE TITLE	UNIT	TOPICS	CREDITS	NO. OF LECTURES
USZOVEC106	**Environmental Zoology**	1	Fundamentas and History of Environmental Science	**2**	**30**
		2	Natural Resourses and Associated problems		

Course Objectives:

- To provide knowledge about Environment to the students.
- To apply the knowledge about Environment science .
- To apply information about various pollutions

Course Outcomes:

On completion of this course, learners will be able to:

CO1: Define, comprehend, scope and significance of Environmental science

CO2: They can aware about pollutions

CO3: Acquire the knowledge on pollution and their adverse effects

Course Contents:

Unit	Description	Lectures
I	**Fundamentas and History of Environmental Science**	**(15Hr)**
	1.1 Introduction	**01Hr**
	1.2 Environmental pollution	
	1.2.1 Air pollution	**02Hr**
	1.2.2 Sources , pollutant	**02Hr**
	1.2.3 Effects on Human and animals	**02Hr**
	1.2.4 Air quality standards	**02Hr**
	1.2.5 Water pollution	**01Hr**
	1) Sewage, Industrial waste Agricultural runoff	**01Hr**
	2) Eutrophication BOD and COD	**01Hr**
	3) Marine Pollution	**01Hr**
	4) Soil Pollution	**01Hr**
	5) Noise and radiation pollution	
II	2.1 Natural resources and associated problems	**(15Hr)** **03Hr**
	2.2 Uses of Forest	**02Hr**
	2.3 Major causes of deforestation	**02Hr**
	2.4 Dams and other effects on forest and tribal people	**02Hr**
	2.5 Overutilization ground water and surface water	**02Hr**
	2.6 Mineral resources	**02Hr**
	2.7 Types of Mining	**02Hr**
	2.8 Changes cause by Agriculture and overgrazing	
	2.9 Disease and control measures.	

EXAMINATION PATTERN FOR MAJOR/OE/IKS/VEC

- **Continuous Internal Assessment (20 Marks):**

Sr. No.	Particulars	Marks
1	One Assignment.	10
2	Departmental Activity	05
3	Overall conduct as a responsible learner, mannerism and articulation and exhibit of leadership qualities in organizing related academic activities	05
	Total	20

Semester End Examination (30 Marks):

Question Paper Pattern

1. These examinations shall be of **One Hour** duration. Maximum marks 30.
2. There shall be Three questions each of **10 marks**. Questions 1 will be based on **Unit-I , Questions 2** will be based on **Unit-II**. Question 3 will be based on Unit III
3. All questions shall be compulsory with internal choice within the questions. (Each question will be of 10 **marks** with options.)
4. Question may be subdivided into sub-questions A, B, C the allocation of marks depends on the weightage of the topic.

Distribution of external 60 marls

Qn.	Sub-Qn	Particulars	Unit	Marks with options	Total Marks for qn
1	**A,B,C**	Answer the following (Attempt **any one out of** three)	**I**	30	10
2	**A,B,C**	Answer the following (Attempt **any one out of** three)	**II**	30	10
3	**A,B,C**	Answer the following (Attempt one **out of** three)	**III**	30	10
		Total		**90**	**30**