ABILITY ENHANCEMENT COURSE (AEC)

DEPARTMENT OF ZOOLOGY

Ability Enhancement Course (AEC) - Aquarium Fish Keeping

No. of Hours – 45

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title	**Credits**	**Credit distribution of the Course**			**Eligibility criteria**	**Pre-requisite of the Course (if any)**
		Lecture	Tutorial	Practical/Practice		
AEC: Aquarium Fish Keeping	2	1	0	1	Passed Class XII with Biology	Nil

Learning Outcomes:

After studying this course, the students will be able to:

- Understand the biology, maintenance and feeding of ornamental fish.
- Learn about the fish keeping industry and aquarium fish production.
- Understand the structure and functioning of the insurance sector.

- Understand the skills needed to set up an aquarium.
- Identify and differentiate between different aquarium fish.

Unit	Topic	No. of Hours
Unit I	The potential scope of Aquarium Fish Industry as a Cottage Industry; Exotic and Endemic species of Aquarium Fish. Study of different species of Aquarium fish and biology (Breeding, Feeding economic importance etc) of exotic and endemic fish. Common characters and sexual dimorphism of Fresh water and marine aquarium fish such as Guppy, Molly, Sword tail, Gold fish, Angel fish, Blue morph, Anemone fish and Butterfly fish.	**05**
Unit II	Use of live fish feed organisms (Advantages and disadvantagesof live food), Use of formulated feeds, Types of formulated feed, Formulation and preparation of feed, Advantages and disadvantages of formulated feed.	**05**
Unit III	Live fish transport (Capture and Pre-transport maintenance, capture and handling techniques); Fish packing and transport (Closed and open transport system, Preparation for packaging, Procedure for packaging, Precautions, Post transport maintenance) General handling techniques.	**05**
Practical		
	1. Design and construction of ideal fish farm (aquarium) and its maintenance. 2. Identification and study of common hill stream fishes and ornamental fishes. 3. Study of aquatic weeds. 4. Collection and examination of water sample; estimation of dissolved oxygen and free carbon dioxide.	**30**

Recommended Readings
Textbooks

- Freshwater Aquariums For Dummies- Heleine
- Nature aquarium world- Amano and Takashi
- Aquarium Fish Keeping- S. Saha
- Ultimate Encyclopedia of Aquarium Fish and amphibia; Fish Care- M. Bailey
- Aquaponic Gardening- S. Bernstein

Ability Enhancement Course (AEC) - Wildlife Conservation and Management

No. of Hours – 45

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title	Credits	Credit distribution of the Course			Eligibility criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical/Practice		
AEC: Wildlife Conservation and Management	2	1	0	1	Passed Class XII with Biology	Nil

Learning Outcomes:

After studying this course, the students will be able to:

- Understand the general principles of ecology as how it related to terrestrial and aquatic animal conservation and management.
- Identify species, characteristics, habitat requirements and life cycles of birds, fish, and mammalian wildlife species.
- Impart field-based training to students how it will be applicable to solve problems related to wildlife conservation and management.

Unit	Topic	No. of Hours
Unit I	Indian Wildlife: Introduction, Distribution of Wildlife in Ecological Subdivision of India, IUCN Categories. Protected Area Network: National Parks, Wildlife Sanctuaries, Biosphere Reserves and Zoos in India, Gene Pool, Habit, Habitat and Breeding Biology of Few Mammals (Viz., Elephant and Tiger). Reasons For Wildlife Depletion: Habitat Fragmentation, Habitat Destruction, Commercial Wildlife Exploitation, Overgrazing Etc., Wildlife Conservation (Policies and Programmes), Special Projects for Endangered Species (Project Tiger, Gir Lion Sanctuary Project and Crocodile Breeding Project).	**05**
Unit II	Principle and Practice of Wildlife Management: Management of Special Habitats; Riparian Zones, Grasslands Introduction to Conservation Biology, Conservation Values and Ethics of Conservation of Natural Resources. Conservation of Biodiversity, Patterns and Processes, Concepts of Biodiversity, Levels of Biodiversity, Genetic Diversity, Intra	**05**

	Specific Diversity, Species Richness, Richness of Higher Taxa, Ecosystem and Biome Diversity.	
Unit III	International Conventions on Conservation (Ex-Situ and in-Situ Conservation, Conservation Breeding (E.G. Vulture, Pygmy Hog, Gharial, Etc.), Institutions and their Role in Conservation (Zoos, Natural History Museums and Collections, Zoological Survey of India and Its Regional Centres. National and International Zoological Institutes, Societies and Academic Bodies. Brief Account of Wildlife Acts and Their Amendments in India and World. Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).	**05**
Practical		
	1. Case studies of Zoo, wild life sanctuary, National parks. 2. Project work on endangered and endemic fauna of Uttarakhand. 3. Studies on role of scientific institution and academic bodies on wild life conservation. 4. Study of major faunal groups of India. 5. Wild life photography.	**30**

Recommended Readings

Textbooks

- Ecology, Wildlife Conservation andamp; Management- T. Gupta
- Human Conflict and Wildlife Conservation- K. Sharma
- Sustainable Development of Natural Resources and Wildlife Conservation- A. K. Dubey
- Wildlife Ecology, Conservation, and Management (Wiley Desktop Editions)- M. J. Fryxell, A. R.

ESinclair and G. Caughley

- Reminiscences of Indian Wildlife- R. S. Dharmakumarsinhji

Ability Enhancement Course (AEC) –Fish Farming

No. of Hours – 45

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title	Credits	Credit distribution of the Course			Eligibility criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical/Practice		
AEC:Fish Farming	2	1	0	1	Passed Class XII with Biology	Nil

Learning Outcomes:

After studying this course, the students will be able to:

- To introduce the learner to different types of freshwater fishes and the significance of Fisheries in the region of study
- Knowledge of the different types of Integrated Fish Farming practices.
- To learn about the different feeds and feeding for culture fisheries
- A thorough knowledge of the mechanism of preservation and processing of fish.

- To allow the learner to get exposed to the different diseases affecting the fishes
- To capacitate the learner on the water quality parameters analysis important for Fisheries.

Unit	Topic	No. of Hours
Unit I	Introduction to Fish, Types of Fish, Small Indigenous Fish species, Air breathing Fishes, Snake heads etc. and Fisheries: Its importance, Types of fisheries. Morphology of some commonly available Fish, Meristic and Morphometric analysis of Fish and its significance, Importance of growth and age studies. Overview of national and international aquaculture systems. Systems of aquaculture - pond culture, cage culture, running water culture, zero water exchange system, raceway	**05**
Unit II	Classification of fish based on food and feeding habits, Digestive system and process of digestion, Gut analysis and Gastrosomatic Index and its relevance.Reproductive organs of fishes, Morphological Differentiating features of Males and Female fishes, Transportation and Rearing of brood fish. Wet and Dry Bundh methods for Induced breeding of Carps. Diseases of fish with special reference to the diseases in the region and its management. Use of herbal medicine in fish disease management	**05**
Unit III	Fish production: Monoculture, polyculture and integrated culture systems. Integrated	**05**

	Fish farming- Agro Based and Livestock based. Composite Fish culture and its benefits. Floating, semifloating, sinking and stable feeds for aquaculture, Feed making methods. High energy feeds, Alternative protein sources for feeds, maturation diets to enhance breeding efficiency, Larval feeds. Nutritional requirements of cultivable fishes, feed formulation. Commonly used feed ingredients. Novel feed ingredients, estimation of quality of feed ingredients. Selection of ingredients, formulation of feeds,	
Practical		
	1. To identify the freshwater species. 2. To study the traditional and modern fish gears and crafts. 3. Permanent preparation of fish scales. 4. Calculation of Gonado-somatic index (GSI) of fish	**30**

Recommended Readings

Textbooks

- A text book of fish, fisheries and technology – K. P. Biswas
- Indian Council of Agricultural Research. Handbook of fisheries and aquaculture, 1stedition, 2006. S.Ayyappan, J. K. Jena, A. Gopalakrishnan and A. K. Pandey
- Publisher Directorate of Information and Publications of Agriculture, Indian Council of Agricultural Research, 2006.

Ability Enhancement Course (AEC) - Applied Zoology

No. of Hours – 45

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title	Credits	Credit distribution of the Course			Eligibility criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical/Practice		
AEC: Applied Zoology	2	1	0	1	Passed Class XII with Biology	Nil

Learning Outcomes:

After studying this course, the students will be able to:

- Remember the biology of silk worms, Honey bees, Earth worm and Pearl oyster.
- Apply the methods used for culturing various useful organisms for commercial purposes.
- Analyze the technical aspects of different animal cultures.
- Evaluate the prospects of Sericulture, Vermiculture, Apiculture and Pearl culture.

Unit	Topic	No. of Hours
Unit I	Introduction to: • Pisciculture: Cultivable fishes. • Sericulture: *Bombex mori*, types of silk worm and its rearing.	**05**

	• Apiculture: Types of honey bees, typical honey and culture of *Apis melifera* and natural enemies. • Lac culture • Pearl culture • Piggery • Poultry • Vermiculture	
Unit II	Bionomics and control measures of the common pests of fruits (*Papilio demoleus*and *Quadraspidiotusperniciosus*), Vegetables (*Thrips tabaci* and *Aulacophorafoveicollis*) and stored grains (*Callosobruchus chinensis* and *Trogoderma granarium*). Polyphagous pests (Locust and Termites).	**05**
Unit III	Pest management, including insect pest control and integrated pest management.	**05**
	Practical	
	1. Identification of honey bee species and hive management. 2. Project work on apiculture, pisciculture, sericulture and vermiculture. 3. Study of major insect pest of crops, vegetable and stored grains	**30**

Recommended Readings

Textbooks

- Applied Zoology- N. Arumugam and T. Murugan
- Text Book of Applied Zoology: Vermiculture, Apiculture, Sericulture, Lac Culture, Agricultural Pests andtheir Controls- P. Jabde

- Applied and Economic Zoology- Tripurari Mishra
- Applied and Economic Zoology- Ashok Kumar