SKILL ENHANCEMENT COURSE (SEC)

DEPARTMENT OF ZOOLOGY

Semester I

Skill Enhancement Course (SEC) - Vermiculture

No. of Hours – 45

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

CourseTitle	**Credits**	**Credit distribution of the Course**			**Eligibility criteria**	**Pre-requisite of the Course (if any)**
		Lecture	Tutorial	Practical/Practice		
SEC: Vermiculture	2	1	0	1	Passed Class XII with Biology	Nil

Learning Outcomes:

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

- Learn about earthworm biology and role of earthworm in soil in association with microorganism.

- Identify different species of earthworms and compare their characteristics.
- Learn about biodiversity: Students can learn about the biodiversity of local earthworms.

Unit	Topic	No. of Hours
Unit I	Introduction of earthworms: Habit, habitat, external features, classification, Taxonomic position andcocoon formation of earthworms. Earthworms as indicator of soil fertility, as plant growth promoters, as soil health regulators. Ecological habitat grouping – Epigeic, Endogeic and Anecic. Earthworms as environment protectors, Earthworm in organic farming and decomposition, food, medicine, and baits.	**05**
Unit II	Vermiculture at small scale (kitchen, home garden etc.). Commercial viability at large scale. Advances and recent developments in vermicomposting. Farm waste as vermicomposting materials. Selection of efficient and abundant earthworm species for vermicomposting. Applications of vermicomposting.	**05**
Unit III	Vermicompost: Acomparative analysis with chemical fertilizers in terms ofcrop yield and eco-friendly nature. Earthworms in bio-remediation, as protein source. Earthworm and as model organism for current researchspecial reference to soil toxicology.Role of Earthworms in organic waste management, microbial interactions in the decomposition of organic matter.	**05**
Practical		
	1. Construction of vermicompost pit 2. Staking and cultivation of Earthworm species. 3. Physicochemical parameter of soil for vermicomposting.	**30**

	4. Collection and identification of caste and cocoon from compost pit. 5. Economical importance of vermicompost and its marketing viability.	

Recommended Readings
Textbooks:

- Biology and Ecology of Tropical Earthworms - Priya Shankar Chaudhari and S.M. Singh
- Vermiculture and Vermi-Biotechnology- Dr.Rajiv K. Sinha
- Vermitechnology: The Biology of Earthworms -R. K. Dutta
- Principles of Organic Farming- E. Somasundaram, D. Udhaya Nandhini
- Vermicomposting For Sustainable Agriculture- R. K. Pawar

Semester II

Skill Enhancement Course (SEC) – Biofloc Fish Culture

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		
SEC:Biofloc Fish Culture	2	1	0	1	Passed Class XII with Biology	Nil

Learning Outcomes:

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

- Learn about the basics of Biofloc technology and it's important as a skill for self-sustainable and self-employment
- Learn production of fish in the larger scale with minimum use of water source and land to help in the total production of fish for human consumption in India.
- Learn about how to set-up the technology looking into the different conditions and availability of space and training.
- Understand the fundamental concept of running this system with the biological knowledge of bacteria culture, water quality management
- To learn the types of fish species, types of feed and feeding, density of fish to be maintain in the particular volume of water etc.

Unit	Topic	No. of Hours
Unit I	Introduction to basics of Biofloc technology and its applications in aquaculture industry, Standard operating procedure, Microbial Role in Biofloc System, Design Set-up and installation of Biofloc system, Biosecurity, Advance over	**05**

	pond aquaculture.	
Unit II	Monitoring water quality parameters: Floc volume,Floc water preparation Monitoring and management of Dissolved Oxygen level and aeration, pH, Conductivity, Temperature, Salinity, Ammonia, Nitrate, Nitrite, TDS optimum for management of Biofloc Culture. Role of Bacteria in management of water quality.	**05**
Unit III	Criteria of Suitable species selection, Pre-stocking and post stockingmanagement,Food and feeding management, Production performance, Nursery rearing days, Survival (%),Average body weight at harvesting period, feed conversion ratio. C:N ratio management, Nutritional requirements and protein levels in the food. Source of carbon, calculation of carbon and nitrogen ratio, suitable C:N ration management in the initial floc preparation and during culture days. Selection of species-specific food with optimum protein level, foodsize, quantity of feed according to per cent body weight, feeding rate.	**05**
Practical		
	1. Construction and maintenance quality of Biofloc fish tank. 2. Physicochemical parameters optimum for Biofloc fish culture. 3. Stocking, harvesting and marketing of Biofloc product.	**30**

Recommended Readings

Textbooks:

- Ezhilmathi, S and S FelixIntensiveBiofloc Nursery System for Vannamei Shrimp by Ezhilmathi, S and SFelix, Scholars World (Scholars World)
- Biofloc Technology (BFT): A Review for Aquaculture Application and Animal Food Industry
- MaurícioEmerenciano, Gabriela Gaxiola and Gerard Cuzon

Semester III

Skill Enhancement Course (SEC) – Hematological Techniques

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		
SEC: Hematological Techniques	2	1	0	1	Passed Class XII with Biology	Nil

Learning Outcomes:

Unit	**Topic**	**No. of Hours**
Unit I	Introduction to Hematology: Introduction to Blood, Functions of blood (Transport Functions, protective function, Regulatory Functions, Homeostatic	**05**

	and Miscellaneous Functions). Composition of blood:Erythrocyte Parameters: RBC count, Hemoglobin (Hb), Hemoglobin estimation (Methods: Sahli's, Cyanmethemoglobin, etc.). Hematocrit (Hct). Leukocyte Parameters: WBC count, Differential countPlatelet count.Erythrocyte Sedimentation Rate (ESR).	
Unit II	Hemopoiesis (Blood cell formation): Definition of hempoiesis, sites of hempoiesis, Types of hemopoiesis, Regulation and disorders of hemopoiesis. Blood collection techniques in chordates (Vertebrates). Anticoagulants used in hematology. **Blood Coagulation and Blood Typing:** Mechanism of blood coagulation. Bleeding time and clotting time. Prothrombin time (PT) and Activated Partial Thromboplastin Time (APTT). Blood groups and Rh factor determination	**05**
Unit III	**Hematological Disorders and Diagnostic Techniques:** Common hematological disorders: Anemia, Leukemia, Thrombocytopenia. Blood parasites in chordates (e.g., Plasmodium, Trypanosoma). Immunohematology and role of blood in immunity. Advanced techniques in hematology: Flow cytometry, Hematological analyzers. Clinical significance of hematological tests.	**05**
Practical		
	1. **WBC and RBC cell count.** 2. **Bleeding time, Clotting time,**	**30**

	3. **Haemoboglobin Estimation.** 4. **Total Leukocyte count, Differential Leukocyte count.** 5. Estimation of ESR in human blood	

Recommended Readings

Textbooks:

- "Fundamentals of Hematology" – P. Chakraborty
- "Textbook of Hematology" – Shirish M. Kawthalkar
- "Essentials of Hematology" – Purnima D. Kharkar
- "Comparative Hematology: Studies in Animals and Humans" – P.N. Campbell
- "Hematology: Clinical Principles and Applications" – Bernadette Rodak

Semester IV

Skill Enhancement Course (SEC) - Sericulture

No. of Hours – 45

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course	Credit	Credit distribution of the Course	Eligibility criteria	Pre-requisite of

Title	s	Lecture	Tutorial	Practical/Practice		the Course (if any)
SEC: Sericulture	2	1	0	1	Passed Class XII with Biology	Nil

Learning Outcomes:

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

- Understand overall aspects of sericulture
- Creates awareness among students about the economic importance and suitability of sericulture in India.
- Learn various technologies involved in sericulture.

Unit	Topic	No. of Hours
Unit I	**Introduction to sericulture: History development and economic significance of silk production. Introduction to non-violent aspect of sericulture and its promotion.** Major silkworm species and their life cycles: mulberry silkworm (Bombyx mori), Tasar, Eri, Munga. Environmental conditions required for silkworm rearing.	**05**
Unit II	**Importance of Mulberry**leaves**in sericulture.**Propagation, planting, irrigation, and disease management in mulberry farming. Requirements, maintenance and Disease Pest control of silk worm. **Silk worm Production and Harvesting: Formation, methods, factors, preservation, quality,** Cocoon sorting and marketing.	**05**
Unit III	**Silk Reeling and Processing:** Methods of silk reeling: **Charka, Filature,**	**05**

	Automatic reeling. Quality assessment of silk. **Diseases and Pest Management in Sericulture.** Economic and commercialization viability of sericulture.	
Practical		
	1. **Various aspects of Sericulture in field.** 2. Maintenance/Rearing techniques of Silk worm in laboratory conditions food and feeding behavior of Silk worm (Mulberry and Non-Mulberry) 3. Physicochemical parameters for silk moth rearing **Silk worm** 4. **Production and Harvesting.** 5. **Marketing of silk products.**	**30**

Recommended Readings
Textbooks:

- Handbook of Practical Sericulture – U.J. Nagaraj
- Sericulture in India: Economics and Opportunities – K. M. Reddy