

**Shri Lal Bahadur Shastri Degree College, Gonda**  
**(Affiliated to Dr Ram Manohar Lohiya Avadh University,**  
**Ayodhya, U.P.)**

***Department of Zoology***

**(Certificate Course in Aquatic Systems and Fisheries)**

**Certificate Course**

**Syllabus**

**Course Overview:** This course aims to provide students with a thorough understanding of aquatic ecosystems and fisheries management. It covers the biological, ecological, and socio-economic aspects of freshwater and marine environments, as well as practical skills in sustainable fisheries and aquaculture.

**Module 1: Introduction to Aquatic Systems (4 Hours)**

- Overview of Aquatic Ecosystems
- Types of Aquatic Habitats: Freshwater, Brackish, and Marine
- Physical and Chemical Properties of Water
- Major Aquatic Biomes and their Characteristics

**Module 2: Aquatic Biodiversity (4 Hours)**

- Overview of Aquatic Flora and Fauna
- Primary Producers: Algae and Aquatic Plants
- Invertebrates: Zooplankton and Benthos
- Vertebrates: Fish, Amphibians, Reptiles, Birds, and Mammals
- Importance of Biodiversity in Aquatic Ecosystems

**Module 3: Ecology of Aquatic Systems (4 Hours)**

- Trophic Dynamics and Food Webs
- Nutrient Cycles in Aquatic Systems
- Productivity and Energy Flow
- Population Dynamics and Community Structure
- Ecological Interactions: Predation, Competition, and Symbiosis

**Module 4: Fisheries Science (4 Hours)**

- History and Development of Fisheries
- Types of Fisheries: Capture and Culture
- Fish Biology and Life Cycles
- Fish Population Dynamics and Stock Assessment
- Fish Harvesting Techniques and Gear

### **Module 5: Aquaculture (4 Hours)**

- Introduction to Aquaculture
- Types of Aquaculture Systems: Extensive, Semi-Intensive, and Intensive
- Species Selection and Breeding Techniques
- Nutrition and Feeding Practices
- Health Management and Disease Control

### **Module 6: Fisheries Management and Conservation (4 Hours)**

- Principles of Sustainable Fisheries Management
- Fisheries Policies and Regulations
- Conservation Strategies for Aquatic Resources
- Marine Protected Areas and Fish Sanctuaries
- Community-Based Fisheries Management

### **Module 7: Socio-Economic Aspects of Fisheries (3 Hours)**

- Economic Importance of Fisheries
- Fisheries and Livelihoods
- Market Chains and Trade in Fish Products
- Challenges in Fisheries Sector
- Role of Fisheries in Food Security and Poverty Alleviation

### **Module 8: Practical Sessions and Field Visits (3 Hours)**

- Water Quality Testing and Analysis
- Identification of Aquatic Organisms
- Sampling Techniques for Aquatic Studies
- Visit to Local Fisheries or Aquaculture Facilities
- Hands-On Experience with Fish Farming Practices

### **References:-**

1. Keddy, P. A. (2010). *Aquatic Ecology: Principles and Applications*. Cambridge University Press. ISBN: 978-0521836375.
2. Royce, W. F. (1996). *Introduction to the Practice of Fishery Science, Revised Edition*. Academic Press. ISBN: 978-0126009527.
3. Pillay, T. V. R., & Kutty, M. N. (2005). *Aquaculture: Principles and Practices*. Blackwell Publishing. ISBN: 978-1405105323.
4. Wellby, I., Girdler, A., & Welcomme, R. (2001). *Fisheries Management: A Manual for Still Water Coarse Fisheries*. Wiley-Blackwell. ISBN: 978-0632056194.
5. Boyd, C. E. (2015). *Water Quality: An Introduction*. Springer. ISBN: 978-3319174447.
6. Welcomme, R. L. (2001). *Inland Fisheries: Ecology and Management*. Wiley-Blackwell. ISBN: 978-0852382674.
7. Naylor, R. L., et al. (2000). Effect of Aquaculture on World Fish Supplies. *Nature*, 405, 1017-

1024. DOI: 10.1038/35016500.

8. FAO. (2020). *The State of World Fisheries and Aquaculture 2020: Sustainability in Action*. FAO. ISBN: 978-9251326923.
9. Beveridge, M. C. M., & McAndrew, K. B. (2000). *Tilapias: Biology and Exploitation*. Springer. ISBN: 978-0792360818.
10. Coates, D. (2002). *Inland Capture Fishery Statistics of Southeast Asia: Current Status and Information Needs*. FAO. ISBN: 978-9251047835.

**Scheme of Examination: 100 Marks**

- |                                 |                         |
|---------------------------------|-------------------------|
| <b>1. Discussion Session: -</b> | <b>Duration 1 Hours</b> |
| <b>2. Presentation: -</b>       | <b>Duration 1 Hours</b> |

**(Head Dept. of Zoology)**