



# ADVANCED AQUACULTURE TECHNOLOGY

## **PROF. GOURAV DHAR BHOWMICK**

Department of Agricultural and Food Engineering  
IIT Kharagpur

**PREREQUISITES:** Basic Knowledge in Higher Secondary Mathematics, Biology, and Physics

**INTENDED AUDIENCE:** UG/PG Scholars of Agricultural and Food Engineering, Aquacultural/Fisheries Engineering or Science

**INDUSTRY SUPPORT:** Aquacultural farms and processing industries.

## **ABOUT THE COURSE:**

The course is dealt with technological advancement in the field of aquacultural engineering all over the globe. The science behind the conventional and advanced technologies in the aquacultural sector is discussed, along with the basic engineering details. The necessity of strict environmental considerations is also discussed, along with the economic return. The audience of the course is expected to be acquainted with the career opportunities in this field that align with the Neel Kranti Mission of the Government of India.

## **ABOUT THE INSTRUCTOR:**

Prof. Gourav Dhar Bhowmick joined IIT Kharagpur, India, in 2021, where he is currently an Assistant Professor in the Aquacultural Engineering Specialization of the Agricultural and Food Engineering Department. He did his M.Tech. and Ph.D. from IIT Kharagpur, India, and then he went to Ben-Gurion University of the Negev, Israel, to do his Post-Doctoral research. He is a recipient of the prestigious GYTI award 2016. He has published 34 international peer-reviewed journal papers and presented his research to 12 International conferences. Dr. Gourav Dhar Bhowmick has expertise in developing bio-engineering interfaces for aquaculture in areas like engineering and design of aquacultural facilities, commissioning, operation, materials selection, and their uses in recirculatory aquaculture systems. He is now investigating the smart aquaponics systems for urban farming. Other than that, Dr. Bhowmick is also working on the end-of pipe treatment of marine and freshwater aquaculture systems, focusing on pollutant removal and biogas production in line with residual resources engineering for environmental remediation.

## **COURSE PLAN:**

**Week 1:** Introduction to Aquaculture: Characteristics of important cultivable fish and shellfish; Selection criteria, Water budget, and Conservation strategies.

**Week 2:** Technology of Closed Aquaculture: Transformation of open culture to closed high tech technology; Intensive farming in high-tech tanks, Re-circulatory system; Flow-through system, Raceway culture.

**Week 3:** Farming systems: Polyculture, Integrated multitrophic aquaculture; Coastal and Mariculture, Algal culture, Macroalgae or Seaweed culture, Pearl culture.

**Week 4:** Technology of Crustacea farming: Culture of freshwater prawn, shrimps, and crabs.

**Week 5:** Technology of larval rearing: Design and construction of hatcheries for carp, prawn, and shrimps; Maintenance of optimum conditions.

**Week 6:** Aquafeed Technology: Balanced diet, Feed formulation, Linear programming, Feed additives, Feed conversion ratio (FCR), Protein retention, Calorie retention.

**Week 7:** Water Quality Management: Important water quality parameters, Criteria for aquaculture, Aeration, and Chemical treatment.

**Week 8:** Technology of wastewater treatment: Conventional systems, Bio-electrochemical systems, Zero water exchange, and Reuse.

**Week 9:** Technology of organic farming: Wastewater- fed aquaculture, Integrated farming, Biofloc technology.

**Week 10:** Technology of Cleaner Production: Green aquaculture, Smart Aquaponic system, Bioremediation, Biofiltration, Eco-labelling.

**Week 11:** Aquaculture Industries: Technology of Fish products and Byproducts, Zero waste recycling.

**Week 12:** Environmental considerations: Impact of Climate Change on aquaculture, Mitigation and adaptive strategies.