MRSC A145: INTRODUCTION TO AQUACULTURE

Item	Value
Curriculum Committee Approval Date	03/12/2025
Top Code	040100 - Biology, General
Units	3 Total Units
Hours	54 Total Hours (Lecture Hours 54)
Total Outside of Class Hours	0
Course Credit Status	Credit: Degree Applicable (D)
Material Fee	No
Basic Skills	Not Basic Skills (N)
Repeatable	No
Open Entry/Open Exit	No
Grading Policy	Standard Letter (S)

Course Description

This course introduces students to the science of freshwater and marine aquaculture. Curriculum will include information on designing, building, and maintaining recirculating aquaculture systems (RAS) for a diverse array of aquatic organisms. Course content will emphasize the husbandry of commonly aquaculture species, issues associated with health and disease, biosecurity, reproduction, and introduction to policy and business environment of contemporary aquaculture. ADVISORY: MRSC A120. Transfer Credit: CSU.

Course Level Student Learning Outcome(s)

1. Describe the role aquaculture can play in various industries in helping ecological restoration and socioeconomic development.
2. Describe how to design and maintain life support systems and manage water quality in recirculating aquacultured systems.
3. Describe best practices pertaining to biosecurity, proper quarantine methods, disease management, nutrition, and reproduction of commonly aquacultured species.

Course Objectives

- 1. Foundational Knowledge: Understand the basic principles of recirculating aquaculture systems (RAS) for use in various industries such as food production, ornamental propagation, research studies, and stock restoration.
- 2. System Design: Learn how to design, construct, and maintain different types of recirculating aquaculture systems suitable for various scales and environments.
- 3. Biology and Ecology: Explore the biological and ecological aspects of commonly aquacultured species including different species of fish, invertebrates, and algae.
- 4. Water Quality Management: Gain insights into maintaining optimal water quality for a healthy growing environment using various types of filtration and monitoring practices.
- 5. Biosecurity: Evaluate methods for avoiding introduction and managing parasites and infectious diseases in high density environments.
- 6. Economic and Social Impact: Analyze the economic viability and social implications of aquaculture as a tool for sustainability.

Lecture Content

Introduction to Aquaculture. Lecture: Overview of Aquaculture: History, Significance, and Basic Principles. Getting Started with Aquaculture and Culture Systems. Lecture: Site and Species Selection, Types of Water Sources and Different Types of Culture Systems (ponds, raceways, recirculating systems, ocean ranching, and more) Aquaculture Life Support Equipment and Systems. Lecture: Review of Life Support Equipment to Operate Recirculating Aquaculture System. Basic Design Considerations. Water Quality Management. Lecture: Review of Nitrogen Cycle. Parameters for Water Quality and Understanding and Maintaining Water Quality in Culture Systems. Aquatic Animal Nutrition. Lecture: Review of Different Food Types. How to Rear Live Foods. Reproduction and Early Rearing. Lecture: Review Common Aquaculture Species Life Cycles and Review of Different Spawning Methods. Diseases and Parasites of Aquaculture Systems. Lecture: Common Aquaculture Diseases, Diagnosing Disease Problems, and Treatment Options. Harvesting Techniques. Lecture: Best Practices for Harvesting Fish from Aquaculture Systems. Aquaculture Design. Lecture: Exploring Advanced Technologies and Innovative Designs in Aquaculture. Permitting and Government Regulations Required for Aquaculture. Lecture: Aquaculture in a Socioeconomic, Political, and Legal Environment Current Topics in Aquaculture. Lecture: The Role of Aquaculture in Sustainable Agriculture and Food Production

Method(s) of Instruction

- Lecture (02)

Instructional Techniques

Instructor will lecture on course content, offer assignments, and organize case study discussions.

Reading Assignments

Reading assignments from assigned textbook will be used to compliment and expand upon lecture material. These readings will enhance class discussions and written assignments. Students must complete 3 hours of reading each week from the textbook.

Writing Assignments

(1) Research Paper, (2) System Design Proposal, and Reflection Essay. Students must complete 1.5 hour of writing each week.

Out-of-class Assignments

(1) Site Visit, (2) System Monitoring, and (3) Group project. Students must complete 2 hours of out-of-class assignments each week.

Demonstration of Critical Thinking

Students will be evaluated through testing and projects on different recirculating aquaculture systems including life support equipment, species management techniques, and water quality monitoring.

Required Writing, Problem Solving, Skills Demonstration

Writing: Exams and course project will be evaluated on their writing, problem solving and skill demonstration. Problem solving: Students will need to design a recirculating aquaculture system using best practices based on various industry needs.

Eligible Disciplines

Biological sciences: Master's degree in any biological science OR bachelor's degree in any biological science AND master's degree in

biochemistry, biophysics, or marine science OR the equivalent. Master's degree required.

Textbooks Resources

1. Required Timmons, M.B., Guerdat, T., and Vinci, B.J. Recirculating Aquaculture, 4 ed. Ithaca Publishing Company, LLC, 2018 Rationale: As a fairly niche field this one of the most contemporary, complete, and in-depth discussions that we have found in the market.