MRSC A135: AQUARIUM WATER QUALITY

Item	Value
Curriculum Committee Approval Date	11/02/2022
Top Code	040100 - Biology, General
Units	2 Total Units
Hours	72 Total Hours (Lecture Hours 18; Lab 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
Grading Policy	Standard Letter (S)

Course Description

An understanding of basic water quality is fundamental to the ability to properly care for marine organisms in an aquarium setting. This course focuses on the chemical processes and equipment that influence aquarium water quality parameters. Students will be required to evaluate aquarium water parameters as well as identify and demonstrate various methods of influencing those parameters. Course content will emphasize work experience in the OCC Aquarium and successful completion of the course may qualify students to take a national aquarium water quality technician certification exam. PREREQUISITE: MRSC A120 or concurrent enrollment. Transfer Credit: CSU.

Course Level Student Learning Outcome(s)

1. Describe how water quality parameters influence, and are influenced by aquatic organisms in a recirculation system.
2. Demonstrate how to manipulate various water quality parameters to create an aquatic environment suitable for a variety of aquarium species.
3. Accurately test various water quality parameters using a variety of lab techniques and monitoring equipment.

Course Objectives

- 1. Explain how aquarium water quality affects the physiology and health of aquatic organisms in a recirculation system.
- 2. Identify equipment a life support operator can use to manipulate water quality parameters to better care for aquatic organisms in a recirculation system.
- 3. Describe the techniques and procedures for a quality assurance plan to assess the performance of the water quality testing methods and technicians.
- 4. Demonstrate basic water chemistry methods including colorimetric determinations, titrations, potentiometry, and other simple water tests common in aquarium systems.
- 5. Describe the chemistry that supports water quality testing methods and the chemistry that drives the balance and management of a healthy aquarium system.

Lecture Content

Understand the chemistry that drives water quality testing methods Molarity Chemical reactions Alkalinity, pH and buffer Nitrogen cycle Water disinfection and sterilization Dissolved gases Chemistry of filtration Saltwater composition Techniques of water quality testing and monitoring OSHA requirements for laboratory use of hazardous chemicals Laboratory equipment for water quality testing Quality Assurance/Quality Control Standard Curve Calibration Applied mathematics for water quality Absorption spectroscopy including spectrophotometers and colorimeters Meters and electrodes Chromatography Testing for bacteria

Lab Content

OSHA requirements in the laboratory use of hazardous chemicals Criteria for hazard identification including safety data sheets, chemical labeling and personal protective equipment Chemical storage and compatibility of toxic substances, flammable liquids, reactive and explosive hazards, compressed gases, and biohazrds Equipment and procedures used for water quality testing Laboratory equipment used to measure and dispense chemicals Quality Assurance program reviewing blanks, blank spikes, matrix spikes, duplicates, and standard reference samples Perform dilutions Salinity Measure salinity using the following properties or techniques: conductivity, density, evaporation, refractive index and titration Making artificial sea water Dissolved oxygen Measure dissolved oxygen in different aquarium water samples using titration, colorimeter, and a probe sensor with a meter (YSI) Nitrogen cycle Measure nitrate levels using spectrophotometer and colorimeter Create a standard curve pH/buffering/alkalinity Measure using pH meter which includes learning how to calibrate YSI probe Measure using titration Reverse Osmosis Deionized (RODI) system Learn desgin of RODI system and how to change out filters Chromatography to measure chlorine and magnesium concentrations Testing for Bacteria Using IDEXX Quanti-tray method to test total coliforms, E. coli and Enterococcus based on federal requirments to house marine mammals. Dosing chemicals Dosing limiting resources for reef tanks Lanthum chloride dosing to remove phosphates Calculating dosages for animal treatment water > Visit an Aquarium to learn about their water quality program

Method(s) of Instruction

- Lecture (02)
- Lab (04)

Instructional Techniques

This class will employ a variety of instructional techniques. Weekly lab meetings will incorporate class discussions led by the instructor on various water quality parameters in a variety of aquarium systems. Equipment and techniques for improving water quality will be discussed and laboratory activities will provide hands-on experience to better illustrate class concepts. Guest speakers and field trips will help provide additional specialized information realted to water chemistry. Group evaluation of existing OCC Aquarium water quality and methods to improve it will be a consistent theme.

Reading Assignments

Reading assignments will be based on chemical processes and techniques commonly used to maintain aquarium water quality. (less than 0.5 hours / week).

Writing Assignments

Writing assignments will be based on contributing to an ongoing collection of proper water quality standards and procedures that may

be used for future student reference information (less than 0.5 hours / week).

Out-of-class Assignments

Out of class assignments will be based on researching methods of maintaining proper water quality in aquariums (less than 0.5 hours / week).

Demonstration of Critical Thinking

Proper maintenance and disinfection of aquarium water requires knowledge of water quality processes and parameters. Students will need to evaluate aquarium water parameters and identify ways that those parameters may change. This will require students to be able to synthesize information and make determinations on the proper ways to influence water quality.

Required Writing, Problem Solving, Skills Demonstration

Students will be evaluated by their knowledge of water quality processes as well as their ability to demonstrate proper techniques to monitor and influence potential problems.

Eligible Disciplines

Biological sciences: Masters degree in any biological science OR bachelors degree in any biological science AND masters degree in biochemistry, biophysics, or marine science OR the equivalent. Masters degree required.

Textbooks Resources

1. Required AALSO Field Guide Committee. AALSO Field Guide, ed. AALSO, 2020