MRSC A140: AQUARIUM LIFE SUPPORT OPERATION AND MAINTENANCE

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

This course focuses on life support operation and maintenance of aquarium water recirculation systems using a diversity of biological, mechanical, and chemical filtration equipment. Students will learn the principal designs, components, standard operating procedures, and preventative and emergency maintenance for an array of aquarium system types. Course content will emphasize the understanding and proper use of various types of life support and water transportation equipment, and how each component functions to disinfect or manipulate water quality and system characteristics. Students will be required to demonstrate proper equipment operation and maintenance protocols, identify appropriate equipment that can be used to treat hypothetical issues, apply their knowledge to help care for a living collection of organisms, and perform critical evaluations of life support procedures in the OCC Aquarium. Course content will emphasize work experience in the OCC Aquarium and successful completion of the course may qualify students to take a national aquarium life support operator certification exam. PREREQUISITE: MRSC A120. ADVISORY: MRSC A135, MRSC A180 and MRSC A180L. Transfer Credit: CSU.

Course Level Student Learning Outcome(s)

1. Describe how a properly designed aquarium life support system (water quality parameters, water disinfection and transportation) influences the health of aquatic organisms in a recirculation system.
2. Identify common components of freshwater and marine aquarium life support systems and explain what critical aspects of their operation a well-trained aquarium life support operator must know to ensure the safety and welfare of a living collection of aquatic organisms.
3. Demonstrate the ability to design, set-up, operate, maintain and trouble-shoot aquarium life support equipment including biological filtration, mechanical filtration, chemical filtration, centrifugal pumps, and quarantine life support systems.

Course Objectives

- 1. Explain how aquarium water quality affects the physiology and health of aquatic organisms in a recirculation system.
- 2. Identify what steps and 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 safe construction and operation of critical life support components.
- 4. Identify a wide range of life support components for freshwater, temperate, and tropical marine aquarium systems.
- 5. Demonstrate how to properly operate common aquarium life support system components.
- 6. Demonstrate how to properly maintain common aquarium life support system components, including preventative and emergency maintenance of such components and proper data collection and record keeping required.
- 7. Demonstrate proper techniques for assembling and disassembling filtration systems, centrifugal pumps, and quarantine system components.
- 8. Design and build a physical life support system based on the requirements of a specific collection of living organisms.

Lecture Content

I. Principal life support components and requirements A. Life support water quality B. OSHA requirements for safe construction and operation practices C. Tools, materials, electrical requirements, and life support system characteristics D. Biological filtrations systems E. Chemical filtration systems F. Mechanical filtration systems G. Sterilization of aquarium media and water H. Heating and chilling aquarium water I. Selecting and sizing appropriate equipment for life support systems J. Applying fluid dynamics in life support design K. Calcium reactors and reef life support requirements L. Dosing limiting resources for reef tanks M. Different options, installation and operation of aquarium lighting style="font-size: small;">N. Aquaculture life support system requirements O. Redundancies, probes, monitors and controllers II. Skills and procedures for design, operation and maintenance of life support systems P. Assembling and operating biological, chemical, and mechanical filtration systems Q. Cutting, assembling, and manipulating PVC and acrylic R. Disassembling and trouble-shooting centrifugal pumps S. Hands-on design, construction, and installation of a life support system T. Sump design and construction U. Construction and dismantling of quarantine and treatment tanks V. Design, operation and maintenance of aquaculture and aquaponics systems

Lab Content

I. Principal life support components and requirements A. Life support water quality B. OSHA requirements for safe construction and operation practices C. Tools, materials, electrical requirements, and life support system characteristics D. Biological filtrations systems E. Chemical filtration systems F. Mechanical filtration systems G. Sterilization of aquarium media and water H. Heating and chilling aquarium water

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 the life support operation and maintenance of various aquarium systems. Student presentations on special topics will commonly accompany these

discussions. Guest speakers and field trips will help provide additional specialized information. Students will engage in a variety of hands-on practice and application of techniques discussed in class. Group evaluation of existing OCC Aquarium life support systems and organisms will be a consistent theme.

Reading Assignments

Reading assignments will be based on researching the common requirements of life support systems of various organism collections. (less than 1 hour / week).

Writing Assignments

Writing assignments will be based on contributing to an ongoing collection of life support standard operating procedures that may be used for future student reference information (less than 1 hour / week).

Out-of-class Assignments

Out of class assignments will be based on communications with industry professionals to learn about proper life support operation and maintenance of various organism collections (less than 2 hours / week).

Demonstration of Critical Thinking

Proper disinfection and transportation of water to living collections of aquatic organisms requires knowledge of life support system components, operation, maintenance, and water quality parameters. Students will need to evaluate aquarium filtration systems, pumps, lighting, limiting resources, and quarantine procedures to maintain the safety and welfare of a variety of aquatic organisms. This will require students to be able to synthesize information and make determinations on the proper ways to operate and maintain life support system components. The instructor will evaluate students based on their knowledge of life support operation and maintenance and determination of proper system parameters and standard operating procedures.

Required Writing, Problem Solving, Skills Demonstration

Students will be evaluated by their knowledge of life support system components, continued ability to demonstrate proper life support operation techniques, and identify/address potential life support system 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

Other Resources

1. OCC Aquarium Procedure Manual (Most recent edition: Found on course Canvas site)