

AG. 560 AQUACULTURE SCIENCE

COURSE DESCRIPTION:

Aquaculture is the art, science and business of cultivating plants and animals in water. This course emphasizes the scientific knowledge and methods necessary for aquaculture. Students learn the history, the structure and function of aquatic plants and animals, scientific marketing, general management practices supported by science, nutrition, health, water chemistry, and the role of science in structures, equipment, regulations and careers. Students develop writing and thinking skills through complementary laboratory exercises involving experimentation, data collection, analysis and written laboratory reports.

UNITS OF INSTRUCTION INSTRUCTION	MINUTES OF
A. Aquaculture Basics and History	150
B. Aquatic Plants and Animals	750
C. Marketing Aquaculture	250
D. Aquatic Management Practices	650
E. Fundamentals of Nutrition in Aquaculture	550
F. Health of Aquatic Animals	680
G. Water Requirements for Aquaculture	750
H. Aquatic Structures and International Agencies and Regulations	100
I. Career Opportunities in Aquaculture	<u>100</u>
TOTAL MINUTES	4230

CHAPTER OBJECTIVES

A. Aquaculture Basics and History

1. Identify significant events or people who contributed to the development of aquaculture.
2. Explain the National Sea Grant Program and its role in scientific research.
3. Discuss the role of science and technology in the development of aquaculture.
4. Indicate the role of scientific research in the future of aquaculture.

B. Aquatic Plants and Animals

1. Recognize the scientific names for some common aquatic species.
2. List and describe important biological characteristics in selecting a species for aquaculture.
3. Explain how aquatic species save energy when compared to terrestrial species.
4. List and describe the major characteristics of aquatic plants and animals.
5. Discuss the morphology, anatomy, and physiology of common aquatic animals.
6. Name and describe the nine body systems of aquatic animals.
7. Identify and describe the internal and external anatomy of a fish.
8. Identify and describe the basic structure and internal anatomy of crustaceans.
9. Identify and describe the basic structure and internal anatomy of an oyster or mussel.
10. Describe the basic morphology of aquatic plants.

C. Marketing Aquaculture

1. Describe some scientific skills required to maintain the quality fish and fish products.
2. Recognize that development of a marketing plan and strategy requires research.
3. Describe processing.
4. Describe the grading process.
5. List factors to consider when exploring marketing alternatives.
6. Identify food fish processing cuts and forms with their correct descriptions.

D. Aquatic Management Practices

1. Describe ways seeds are produced for different species.
2. Explain how sex is determined in fish.
3. Discuss methods of controlling reproduction in fish.
4. Describe procedures in reproducing aquatic animals.
5. Describe the sexual reproduction processes of aquatic animals.
6. List salmonids that could be or are cultured.
7. Describe the reproduction and life cycle of crayfish.
8. Describe the reproduction and life cycle of shrimp.
9. Distinguish between red swamp and white river crayfish.
10. Describe the commercial production of hybrid striped bass.
11. Identify popular baitfish species.
12. Describe aquatic species and their current culture or potential for culture.
13. Demonstrate a familiarity with the scientific names for different aquatic animals.
14. Describe breeding systems and their purposes.

E. Fundamentals of Nutrition in Aquaculture

1. Identify the parts of the digestive system.
2. Explain the role of the digestive system in absorption.
3. Explain how anatomy and behavior affect feeding.
4. List factors that influence energy requirements.
5. List three sources of energy.
6. Identify factors that affect the digestibility of fat.
7. Explain the role of essential fatty acids and essential amino acids.
8. Name ten essential amino acids.
9. Name two essential fatty acids.
10. List the fat-soluble and water-soluble vitamins.
11. Describe ten effects of vitamin deficient diets.
12. Name the macrominerals and the microminerals.
13. List ten functions of minerals.

F. Health of Aquatic Animals

1. Define terms associated with disease conditions.
2. Discuss disease resistance.
3. Define terms associated with severity of disease or conditions.
4. Discuss the role of stress in fish diseases.
5. Describe the immunization of fish.
6. List signs of stress and disease.
7. Discuss common diseases caused by pathogenic viruses.
8. Discuss common diseases caused by pathogenic bacteria.
9. Describe a fungal infection.
10. Name and describe a common pathogenic protozoan parasite.
11. Name and describe a common pathogenic crustacean parasite.
12. Describe a grub or fluke infection.
13. Name and describe a common pathogenic worm parasite.
14. List noninfectious diseases and give examples.
15. Describe an infection of lice.

G. Water Requirements for Aquaculture

1. Describe the properties of water.
2. List cations and anions found in water.
3. Describe how and why aquatic solutions change.
4. Explain how changes in water affect aquatic life.
5. Match compounds and elements with their chemical.
6. Discuss the importance of oxygen in water quality management.
7. Discuss the role of temperature in oxygen management.

H. Aquatic Structures and Equipment

1. Identify species for pond, cage, raceway, tank or silo culture.
2. List steps in determining a site's water quality.
3. Determine whether soil is suitable for pond construction.
4. Describe the biological concerns in a recirculating or closed system.
5. Compare some of the biological concerns with cages and closed systems.

I. Federal, State, and International Agencies and Regulations

1. Identify agencies that support scientific research in aquaculture.
2. Provide examples of research conducted by government agencies.
3. Give the location of the aquaculture research programs.
4. Name four programs and agencies that provide research information and data to aquaculture.
5. Name five environmental issues addressed by the EPA.

J. Career Opportunities in Aquaculture

1. Identify the careers that require a science background.
2. Discuss what research studies indicate about basic skills and thinking skills for the workplace.

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