

AQUA 106 Small Scale Aquaculture
Tues./Thurs. 10:00-11:15 a.m.
08/21/2017 thru 12/19/2017
Fall 2015 – CRN 61171 – 3 credits

Instructor: Leonard G.L. Young
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Effective Date: Fall 2017

WINDWARD COMMUNITY COLLEGE MISSION STATEMENT

Windward Community College offers innovative programs in the arts and sciences and opportunities to gain knowledge and understanding of Hawaii and its unique heritage. With a special commitment to support the access and educational needs of Native Hawaiians, we provide Oahu's Koolau region and beyond with liberal arts, career and lifelong learning in a supportive and challenging environment — inspiring students to excellence.

CATALOG DESCRIPTION

Survey of possibilities of small scale aquaculture. Application of basic biological and ecological concepts and theories to the selection, planning and design of small scale aquaculture systems. (3 hrs lecture) WCC DB

PREREQUISITES

No prerequisites. Although it would be useful if the student has taken a class in biology before enrolling in AQUA 106. The student is also recommended to take the companion laboratory course AQUA 106L concurrently with AQUA 106. Students enrolling in AQUA 106L will need to pass the IACUC certification process at <https://www.citiprogram.org>. This requirement is necessitated by working with live fish under Federal guidelines. Contact Leonard Young for more information. It would be best to complete this certification process before class begins or within the first two weeks of class.

STUDENT LEARNING OUTCOMES

The student learning outcomes are:

- Describe past and present aquaculture technologies.
- Plan and design a small scale aquaculture system.
- Select appropriate small scale aquaculture organisms.
- Determine the optimal conditions for cultivating small scale aquaculture organisms.
- Develop a small scale aquaculture husbandry and management plan.
- Evaluate the economic feasibility of developing a small scale aquaculture system.
- Describe how the individual relates to the wider issues of sustainability
- Apply concepts of sustainability to local, regional and/or global challenges

REQUIREMENTS SATISFIED BY THIS CLASS

This class may satisfy the Windward Community College Associate in Arts Degree diversification requirement for a Natural Sciences biological science class (DB).

This class may partially satisfy requirements for the Windward Community College Academic Subject Certificate in Bio-Resources and Technology, Bio-Resources Development and Management Track (Elective Set I Technology, Utilization, and Management).

This class may partially satisfy requirements for the University of Hawaii 'i Marine Option Program Certificate as a Marine-Related course.

COURSE CONTENT

Course Content and Topics:

History of Aquaculture

Basic Biological Principles

Types of Culturing Facilities (e.g., ponds, tank, raceways, pens, cages, etc.)

Pond Construction

Environmental Factors Affecting Aquaculture Facilities and their Control (e.g., oxygen, temperature, photoperiod, pH, salinity, nutrients, water motion, toxic materials, etc.)

Non-Desirable Species and their Control

Nutrition and Feeding

Reproduction, Metabolism & Growth

Diseases of Cultured Organisms and their Control

Species-Specific Culture Methods

Polyculture

Hawaiian Fishponds

Best Environmental Management Practices

Harvesting and Processing

Economic Aspects of Aquaculture

Laws and Regulations Governing Aquaculture in Hawaii

Skills or Competencies:

Describe the history of aquaculture.

Describe basic biological principles, including, but not limited to, characteristics of life, chemical basis for life, basic plant and animal metabolism and nutrition, basic genetics, evolution, the classification and nomenclature of living thing, and reproduction and development.

Describe basic ecological principles as they apply to aquaculture, including, but not limited to, environmental factors affecting living things, population growth, intra-and interspecific competition, predator-prey relationships, food chains and webs, biogeochemical cycles, and energy flow through ecosystems.

Describe the design, construction, and operation details for various kinds of aquaculture facilities and methods.

Describe the basic biology and specific culture requirements of common species used in small scale aquaculture.

Compare and contrast the different types of Hawaiian fishponds, describing their respective operations and the species that were cultivated.

Describe the laws and regulations governing aquaculture in Hawaii.

Design a small scale aquaculture system, addressing all aspects of system design, including construction, species, operation, husbandry, maintenance, monitoring, harvesting and costs.

ASSESSMENT AND GRADING

This class is taught in a hybrid modality of lectures allowing you time to ask questions and carry short immediate discussions in class. The grading consist of weekly online assignments to reinforce the ideas and concepts discussed in class. I have assigned no textbook to buy, but there are two that you can either acquire online or buy via Amazon.com (look at the textbook and resources listing below).

Your weekly and continual assignment is to read before class and to use the online resources of CANVAS. Each week you

will be presented with an online overview, readings, group discussion (15 points) and choice of problem reflection (20 points).

GROUP DISCUSSION: You are required to submit 5 responses during the week for the group discussion for 15 points. This will indicate your pursuit of the readings, accumulation of new aquaculture information from the class lecture, student questions and discussions. Ideally, I urge you to search for information online and to be responsible for your own learning. The lectures in class are guidelines for information and learning. The online group discussion is a group learning and collaborative experience.

PROBLEM REFLECTION: The problem reflection will present you with three choices. You only need to choose one question to respond to as a short essay for 20 points.

Towards the end of the semester you will do a **SMALL SCALE AQUACULTURE SYSTEM DESIGN AND PLAN (financial spreadsheet)**. The student will utilize the concepts learned to design and plan a small scale aquaculture system. This written plan will include the following information: (1) detailed description including diagrams that illustrate construction design; (2) species to be cultivated; (3) detailed description for how the system would work; (4) a plan for the husbandry and maintenance of the organisms to be cultivated including the methods for monitoring the operation; (5) harvesting protocols (when and how), including how the harvested products should be processed; (6) description of the permits that may be needed; and (7) an itemized budget detailing the anticipated costs for the construction and operation of the system.

QUIZZES and EXAMINATIONS. There are no in class quizzes, mid-terms or final examination. There will be a peer assessment at Week 5 and 10. The small scale aquaculture system design and plan will be used as the “final” peer assessment during final examination week. The small scale aquaculture system design and plan needs to be done before the end of the semester. You read another student's plan and write the final peer assessment during the examination week period.

The assignment of points will be according to the following protocol:

Group Discussion	16 x 15 = 240 points
Problem Reflection	14 x 20 = 280 points
Peer Assessment	2 x 60 = 120
Final Peer Assessment	100 points
Participation in Class	50 points (variable bonus)

Total Points 740 points

Letter grades will be assigned as follows:

A	90% or above in total points.
B	80-89.9% of total points.
C	65-79.9% of total points.
D	55-64.9% of total points.
F	Below 55% of total points or informal or incomplete official withdrawal from course.
I	Incomplete; given at the INSTRUCTOR'S OPTION when student is unable to complete a small part of the course because of circumstances beyond his or her control. It is the STUDENT'S responsibility to make up incomplete work. Failure to satisfactorily make up incomplete work within the appropriate time period will result in a grade change for "I" to the contingency grade identified by the instructor (see catalog).
CR	65% or above in total points; the student must indicate the intent to take the course as CR/NC in writing by the end of the 10th week of classes (see catalog).
NC	Below 65% of total points; this grade only available under the CR/NC option (see above and see catalog).
N	NOT GIVEN EXCEPT UNDER EXTREMELY RARE CIRCUMSTANCES (e.g., documented serious illness)

	or emergency that prevents the student from officially withdrawing from the course); never used as an alternative for an "F" grade.
W	Official withdrawal from the course after the third week and prior to the end of the 10th week of classes (see catalog).

Waiver of minimum requirements for specific grades may be given only in unique situations at the instructor's discretion. Students involved in academic dishonesty will receive an "F" grade for the course. Academic dishonesty is defined in WCC's college catalog.

LEARNING RESOURCES

Required Textbook

Szyper, J., 1989. Backyard Aquaculture in Hawaii. Windward Community College and Aquaculture Development Program, Hawaii State Dept. of Land and Natural Resources. 87 pp. *This text is available for free through the Internet in pdf format.*

John Lucas and Paul C. Southgate (Editor). Aquaculture: Farming Aquatic Animals and Plants. 505 p. (main textbook, eTextbook sold on Amazon.com)

Pillay, TVR, and MN Kutty, 2005. Aquaculture: Principles and Practices. 640 p. (Wiley-Blackwell. (alternative textbook, also sold on Amazon.com)

Handouts and selected readings from various texts will also be distributed in class.

Supplemental Texts (check the library):

Stickney, R.R., 2000. Encyclopedia of Aquaculture. Wiley. 1088 pp.

McLarney, W., 1998. Freshwater Aquaculture: A Handbook for Small Scale Fish Culture in North America. 2nd ed. Hartley & Marks. 602 pp.

STUDENT RESPONSIBILITIES

The student is expected to attend and actively participate in all course lectures and activities, and complete all assignments, quizzes and examinations on time.

The student is expected to be prepared in advance before the class sessions. Being prepared includes the following: having read text materials (e.g., textbook readings and other resources) assigned for that day's activities and bringing required work materials (e.g., textbook, handouts, writing supplies, etc.) to the session.

Any changes in the course schedule, such as examination dates, deadlines, etc., will be announced ahead of time in class. It is the student's responsibility to be informed of these changes.

It is the student's responsibility to be informed about deadlines critical to making registration changes (e.g., last day of erase period and last day for making an official withdrawal).

Students should expect a level of difficulty comparable to other 100-level science classes intended for non-science majors. When difficult concepts and detailed information are presented, it is the student's responsibility to take the appropriate steps to learn and understand these concepts and information.

Science courses at W.C.C. generally require two to three hours of independent private study time for each hour in class. However, because of the nature of the material presented in AQUA 106, more study time may be required (depends upon the student's science/biology background). It is the student's responsibility to allocate the appropriate time needed for study in an environment conducive to quality study. The student must budget time efficiently and be realistic about all personal and professional commitments that consume time.

HOW TO SUCCEED IN THIS CLASS

Understanding biological science involves understanding many difficult concepts and vocabulary, not just knowing facts. The student should know that the details to these concepts are important. In addition, the student will be introduced to hundreds of new words. In some cases, words that are familiar in a context other than biology will be introduced in the context of biology. The student will need to understand and use these terms in a biological science context.

Students are expected to participate in all lecture activities and complete all course assignments on time. The student will not succeed in this class without taking careful lecture notes and reading the corresponding material in the textbook. As soon as possible (best if done on the same day), the student should copy over these lecture notes filling in gaps and missing information by referring to the textbook and other resources provided. The student should carefully review these rewritten lecture notes as often as possible.

In addition to copying over lecture notes, study activities should include drawing labeled diagrams or graphs that illustrate important biological phenomena (e.g., the internal structure of the cell, the stages of cell division, or the anatomy of the heart). These diagrams need not be works of art, but should clearly illustrate significant information. Before an exam, it would be useful to redraw these labeled diagrams and graphs from memory.

The student should make flashcards for each new vocabulary word presented (refer to lecture outlines for a lists of required terms). The student should use these card for self-testing as often as possible. The student should also practice using the words to explain biological concepts.

The student should do all of the recommended study guide activities and review all of the Internet resource materials provided.

The textbook and other resources may include useful study questions. The student should write out answers to all of these questions as though they were required assignments. Students could exchange these answers and provide constructive feedback to each other.

The student should read the textbook materials corresponding to a particular lecture before and after that lecture.

Students are recommended to establish study groups and study together. The students in these groups may test each other's knowledge and understanding of the information. They may also take turns teaching each other.

The student should ask the instructor to explain the things that the student does not understand.

DISABILITIES ACCOMMODATION STATEMENT

If you have a physical, sensory, health, cognitive, or mental health disability that could limit your ability to fully participate in this class, you are encouraged to contact the Disability Specialist Counselor to discuss reasonable accommodations that will help you succeed in this class. Ann Lemke can be reached at 235-7448, lemke@hawaii.edu, or you may stop by Hale 'Akoakoa 213 for more information.