

AQUA 106L Small Scale Aquaculture Laboratory
Thursdays 1:00-3:45 – 01 Credits

INSTRUCTOR: RuthEllen Klinger-Bowen
OFFICE: Hale Uluwehi
OFFICE HOURS: Wednesday 10:00 – 12:00 pm
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EFFECTIVE DATE: Fall 2017

WINDWARD COMMUNITY COLLEGE MISSION STATEMENT

Windward Community College is committed to excellence in the liberal arts and career development; we support and challenge individuals to develop skills, fulfill their potential, enrich their lives, and become contributing, culturally aware members of our community.

CATALOG DESCRIPTION

Companion laboratory to AQUA 106, Small Scale Aquaculture. Practical, hands-on experiences in small scale aquaculture. Laboratory/field trip class. (3 hrs laboratory) WCC DY

PREREQUISITES

Prior or concurrent enrollment in AQUA 106. Must pass IACUC certification at beginning of semester so you can work with fish at the WCC Tank Fish Facility. This is a Federal requirement.

STUDENT LEARNING OUTCOMES

The student learning outcomes are

- Construct and operate different kinds of small scale aquaculture systems.
- Identify and classify common species of aquaculture organisms.
- Identify anatomical (internal and external) features of aquaculture organisms.
- Operate a small scale aquaculture system to successful harvest of target species.
- Monitor culture conditions (physical, chemical and biological) in small scale aquaculture systems.
- Demonstrate techniques for the cultivation of live food cultivation.
- Demonstrate techniques for the reproduction of aquaculture species.

REQUIREMENTS SATISFIED BY THIS CLASS

- This class may satisfy the Windward Community College Associate in Arts Degree diversification requirement for a Natural Sciences laboratory class (DY).
- 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 Marine Option Program Certificate as a Marine-Related course.

COURSE CONTENT

Content and Topics

- Using the Metric System, Making Measurements, and Data Processing
- Chemical and Physical Parameters of Aquaculture Ponds
- Identification and Anatomy of Aquaculture Organisms
- Possible Construction of Tank Systems
- Feeds Analysis
- Phytoplankton and Zooplankton Food Cultivation
- Spawning, Fertilization, and Development
- Larval Rearing
- Metabolism and Growth of Aquaculture Organisms
- Disease Identification/Diagnosis
- Harvesting Methods
- Tentative Field Trips: local aquaculture farms, market and facilities
- Waste reduction: cradle to cradle

Skills or Competencies

- Maintain a laboratory notebook that adequately documents laboratory and field activities
- Collect quantitative measurements and make calculations (including conversions) using the metric system.
- Calculate averages and standard deviations.
- Present quantitative data in the form of tables and graphs in the proper format.
- Draw figures illustrating observations and present these figures in the proper format.
- Write summaries of laboratory and field activities, documenting these activities and demonstrating an understanding about the significance of the results.
- Use water quality instrumentation to measure the pH, oxygen concentration, salinity, conductivity, temperature, light extinction, and turbidity of the water.
- Use chemical methods to measure nutrient concentrations of aquaculture pond water.
- Use common instruments of the biologist to make measurements and observations: rulers, scales, graduated cylinders, dissection tools, microscopes, and spectrophotometers.
- Identify aquaculture species, citing their scientific names and higher taxonomic classification.
- Recognize external and internal anatomical features of aquaculture species.
- Construct aquaculture systems.
- Analyze/interpret composition and nutritional value of feeds.
- Culture phytoplankton and zooplankton food for aquaculture species.
- Describe techniques for the spawning, fertilization, development and larval rearing of aquaculture species.
- Evaluate the health of aquaculture organisms in terms of metabolism, growth and occurrence of disease.
- Harvest and post-harvest process aquaculture organisms.
- Discuss new developments in aquaculture research.
- Compare and contrast past and present production-scale aquaculture methods.

- Describe sustainability; reduction; adaptive resilience; and how these ideas could be applied to local, national, and international challenges.

ASSESSMENT AND GRADING

LABORATORY NOTEBOOK. The student will maintain a laboratory notebook to record all notes, observations, and information gathered before and during laboratory and field activities. This notebook must be brought to every laboratory period. This notebook will be collected and graded twice during the semester (65 points for the first collection; 65 points for the final collection; 130 points total). The type of notebook and the kind of information required will be explained during the introductory lab session.

LABORATORY ATTENDANCE AND PARTICIPATION. Because hands-on participation in the construction and operation of aquaculture systems is essential to understanding small scale aquaculture, regular attendance and active participation is expected of all students (130 points). Also because laboratories involve considerable set-up/take-down time and supervision, students will NOT be able to make up missed laboratory and field activities. A student missing a scheduled laboratory or field activity because of an illness or legitimate emergency may be given an alternative activity to make up lost lab summary points. In such a circumstance, the student is still responsible for the information presented during the missed laboratory session.

ASSESSMENT AND GRADING

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

Laboratory Notebook/Summaries	120 pt.
60 pts. each time respectively	
Attendance & Participation	150
Laboratory Exams	100
50 pts. each time respectively	
Pass/complete IACUC for basic and fish by Sept. 30, 2016	100
TOTAL	470 pt.

Letter grades will be assigned as follows:

- A** 90% or above in total points and not missing more than one scheduled laboratory activity.
- B** 80-89.9% of total points and not missing more than one scheduled laboratory activity.
- C** 65-79.9% of total points and not missing more than one scheduled laboratory activity.
- D** 55-64.9% of total points and not missing more than one scheduled laboratory activity.
- F** Below 55% of total points or informal or incomplete official withdrawal from course, or if a student misses more than one scheduled laboratory activity for reasons other than documented illness or emergency.
- 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); may be issued if documented serious illness or emergency forces a student to miss more than one scheduled laboratory activity.

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); may be issued if documented serious illness or emergency forces a student to miss more than one scheduled laboratory activity; 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 Textbooks

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.

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

Supplemental Texts

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

Students should carefully review the attached sheet detailing inherently dangerous activities of this course and sign the appropriate U.H. Assumption of Risk and Release and Medical Consent forms. Students are expected to participate in all laboratory activities and complete all course assignments on time.

Students are expected to be prepared in advance when they arrive to class. Being prepared includes the following: having already read text materials (e.g., textbook readings and handouts) assigned for that day's activities, bringing required work materials (e.g., lab notebook, textbook, handouts, writing supplies, etc.), and having completed any assigned pre-lab tasks.

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).

The student should understand that AQUA 106L is a challenging course. Thus AQUA 106LL requires much time and serious dedication.

AQUA 106L LABORATORY AND FIELD ACTIVITIES

Students enrolled in AQUA 106L are advised that certain required course activities are inherently dangerous and may require normal physical abilities. Students are therefore required to read about the inherently dangerous activities described below. In addition, students must read and demonstrate knowledge of their responsibilities while engaged in these activities.

Some students may have physical conditions that restrict their participation in certain laboratory activities. Respiratory ailments, certain allergies, and pregnancy may be among these conditions. Students exhibiting any of these conditions, or any other condition that may be impacted adversely by participation in the activity, should consult a physician.

Inherently Dangerous Activities

Students in the science laboratory may be exposed to chemicals (e.g., formaldehyde, organic solvents, acids, and other caustic chemicals), chemical fumes, laboratory equipment and supplies (e.g., scalpels, razor blades, glass slides, coverslips, and electrical equipment), toxic or irritating properties of living and dead animals, human organic matter (e.g., saliva and blood), and other materials necessary to laboratory activities of this or other laboratory classes. Other possible hazards include broken glass on the floor or counters, combustible materials (e.g., bunsen burner gas), and slippery spills.

During field activities students face risks such as accidents while enroute to and from field destinations, falling out of boats, slipping on wet surfaces, stepping on sharp objects, large waves, strong currents, and dangerous marine life.

Responsibilities of Students in the Laboratory

1. Students should be familiar with safety procedures and take appropriate precautions at all times to insure the safety of every student in the lab.
2. Students should follow instructions carefully, especially when hazardous conditions occur or hazardous materials are being used.
3. Students should locate the placement of safety equipment and supplies in the laboratory: safety shower, eye wash station, fire extinguisher, and first aid kit. Students should understand the use of this equipment. Also note the locations of exits.
4. Anyone injured in the lab, should inform the instructor immediately and take immediate action to reduce the risk of further injury.

5. Students should familiarize themselves with the fire procedures. Extinguish small fires, but leave the building immediately should a major fire occur. Notify the appropriate authorities --don't assume someone else remembered to do it. Meet with other students and your instructor outside the building before leaving so that an accurate headcount may be made.
6. Students should dress appropriately in the lab. Students may elect to supply their own gloves and protective aprons or laboratory coats. Some lab activities may require protective eyewear (provided for the activity by WCC).
7. Students should report all hazardous conditions to the instructor immediately.
8. Chemicals may be poisonous, corrosive, or flammable. No chemicals, even chemicals known to be safe, should be ingested, inhaled, or touched unless specifically directed to do so by your instructor.
9. All organisms, living or dead, should be treated with care and respect. Avoid direct handling when possible.
10. The safe use of specific equipment and tools (e.g., microscopes, slides, scalpels, and pipettes) will be demonstrated by the instructor during the laboratory sessions. Students should be sure they understand this usage.
11. Students should clean up any supplies used and should return materials where they belong as instructed. Any material spilled should be cleaned appropriately. Report and hazardous spills or breakages.
12. Broken glass and sharp metal waste should be placed only in those receptacles marked for such disposal -- do not put these materials in normal trash receptacles.
13. Some chemical wastes may not be dumped into laboratory sinks. In such circumstances an appropriate container will be provided for this waste in the lab.
14. Organic waste resulting from animal dissection activities should be disposed of in the appropriate receptacle, not the ordinary trash receptacles.
15. Human organic materials (e.g., saliva and blood) must be disposed of in such a way as to eliminate any possibility for contamination and the spread of disease. Appropriate handling and disposal procedures will be explained when human materials are involved in the laboratory exercise.
16. After completing laboratory activities and clean up, students should wash their hands in the restroom to avoid spreading contamination and hazardous chemicals.
17. The laboratory is a place for learning. Therefore, eating, drinking, and playing around is prohibited during the laboratory session. Students exhibiting unsafe or inappropriate behavior in the lab may be asked to leave and may be given an "F" grade for the course.

Responsibilities of Students in the Field

1. Field excursions may involve carpooling to field destinations. Drivers are expected to have valid Hawaii driver's licenses, drive safely, and follow all traffic laws. Passengers should not disturb

drivers.

2. When in the field, students should use the buddy system. Partners should have comparable physical skills and should keep track of each other at all times.
3. Students should wear clothing appropriate for the activity and should anticipate all possible weather conditions. Land/shoreline activities require loose-fitting clothing that protects the extremities from sunlight and abrasions (note that this clothing may get wet). Footwear should allow stable walking on rough and/or slippery surfaces (slippers are not acceptable footwear). A hat and sunglasses are also highly recommended. For water activities, a wet suit, or long pants and sleeves, worn over swim suits, are recommended. Gloves and protective footwear are essential. Students should apply sunscreen to all exposed skin areas.
4. When looking under rocks or ledges, students should be prepared for encounters with dangerous marine animals, such as eels, lion fish, and sea urchins. Unless specifically instructed to do so, students should not touch any marine organism.
5. Students should familiarize themselves with potential hazards in an area before beginning an activity. Watch for large waves and dangerous currents. If conditions should become dangerous after the activity starts (e.g., waves pick up or dangerous marine life enters the area), the student should leave the area immediately. Students should inform the instructor immediately when dangerous conditions arise. A student should never feel compelled to do an activity that seems hazardous. A student should refuse to carry out an activity that exceeds his or her physical capabilities.
6. Anyone injured in the field, should inform the instructor immediately and take immediate action to reduce the risk of further injury. Before an activity begins, students will be informed of the location of the first aid kit (which will be taken on every excursion).
7. No one should operate a power boat without specific training. While in power boats, students should remain seated at all times. No power boat should be used without proper safety gear (i.e., first aid kit, life vests, oars, anchor, flares and other essential gear).

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.