Program and Certificate Proposal Signature Page
Windward Community College

1. Name of Proposal: Certificate of Completion in Sustainable Agriculture

2. Proposer

3. Department Review

4. Curriculum Committee Review

5. Faculty Senate Review

6. Division

7. Vice Chancellor for Instruction

8. Chancellor

11/30/12
Certificate of Completion in Sustainable Agriculture Proposal

Date of Proposal: November 1, 2012

Date of proposed implementation: Fall, 2013

Overview

Sustainable agriculture integrates long-term environmental stability with economic profitability in a way that focuses on stewardship of both human and physical resources. In contrast to the ways of farming that have become typical in the last century, sustainable agriculture focuses on reducing energy and resource demands, removing harmful chemicals and by-products of farming, and using alternative processes, such as aquaponics (aquaponics will be used to demonstrate one important method of sustainable agriculture), to create a viable farm.

While models of sustainable farming have existed for centuries, new technologies and the need to conform to modern forms of economic production and regulation, mean that the small-scale farmer seeking to practice sustainable agriculture to acquire a set of skills that include an understanding of aquaponics, of energy systems on farms, of plant science, and of how to plan and operate a business.

The Certificate of Completion in Sustainable Agriculture is a 17-20 credit certificate designed for students who want to engage in small-scale farming in Hawaii.

The certificate will initially target recent high school graduates who reside on the rural Windward coast of Oahu. Many of the students who attend Windward CC originate from families who have strong backgrounds in agriculture, and there will likely be a natural draw from these students to this type of program. Likewise, while approximately 30% of public high school graduates apply for college the remaining student populations are undecided on their career paths and directly enter the work force with little or no training. This limits their ability to secure higher paying jobs or for obtaining the necessary education to advance in their current line of work. People in the workforce who are seeking a new career track are likely candidates for the proposed program by offering a segue way for students to pursue a four year degree at UH Manoa and acquire more advanced training in tropical agriculture.
Program Learning Outcomes

The successful student in the program will be able to:

• Evaluate sustainable farming systems and business plan
• Determine the sustainable farming system suited for a specific location in Hawaii
• Recommend cultural practices, solve problems and cultivate horticultural crops in a sustainable manner based on sound biological and technological principles

Required Courses (17 to 20 credits total)

AG 120 Plant Science 3 credits

The study of plant science, morphology, anatomy, physiology classification, growth, growth regulators, and propagation. Students are required to write a 10 to 15 page research report.

• Describe and explain general plant structure and function in relation to plant growth and development.
• Demonstrate knowledge of horticultural principles in the cultivation of plants.
• Examine commercial agricultural enterprises for to become familiar with employment opportunities and the impact of horticulture on our lives.
• Research and report on a horticultural plant.

| Alignment of AG 120 to Program Learning Outcomes | Evaluate sustainable farming systems and business plan | Determine the sustainable farming system suited for a specific location in Hawaii | Recommend cultural practices, solve problems and cultivate horticultural crops in a sustainable manner based on sound biological and technological principles |
|--------------------------------------------------|-----------------------------------------------------|---------------------------------------------------------------------------------|
| Describe and explain general plant structure and function in relation to plant growth and development |                                                     | X                                                                               |
| Demonstrate knowledge of horticultural principles in the cultivation of plants |                                                      | X                                                                               |
| Examine commercial agricultural enterprises for to become familiar with employment opportunities and the impact of horticulture on our lives | X                                                    |                                                                                  |
| Research and report on a horticultural plant |                                                     |                                                                                  |

Certificate of Completion in Sustainable Agriculture Proposal Page 2
AG 170 Introduction to Aquaponics 4 credits

The course covers aquaculture, hydroponics, aquaponics, sustainable aquatic feed production, renewable local seeding technologies and micronutrient supplementation, fish and plant physiology, renewable energy systems, water catchment and conservation techniques, and best aquaponic food safety practices. The basic physical and biological principles governing sustainable farm and agribusiness operations are emphasized

- Design and construct a basic aquaponic system that uses all three growout technologies (nutrient film technique, ebb and flow, and floating raft) either alone or in combination.
- Apply best aquaculture practices for culturing fishes in an aquaponic setting.
- Identify the water quality parameters and manage them in order to maximize fish, plant and microbial outputs in an aquaponic setting.
- Use best agricultural practices for plant crop production in an aquaponic setting. Prepare seedlings for planting, harvest produce, stagger production of both plant and fish, and apply food safety procedures.

<table>
<thead>
<tr>
<th>Alignment of AG 170 to Program Learning Outcomes</th>
<th>Evaluate sustainable farming systems and business plan</th>
<th>Determine the sustainable farming system suited for a specific location in Hawaii</th>
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AG 171 Farm Renewable Energy Systems  3 credits (to be approved)

This course explores the various renewable energy systems potentially employable on small farms. Topics such as solar, solar thermal, wind, micro-hydraulic, biomass, and hybrid technologies are covered in the course:

- Evaluate solar thermal applications, heating water, drying/cooking food products, running air conditioning systems and distilling water;
- Evaluate solar thermal/photovoltaic systems
- Evaluate wind and Micro Hydroelectric systems
- Evaluate biomass systems, composting, agriculture wastes, ocean plants, feed stock, landfill implications, chemical processes and anaerobic digestion systems
- Evaluate hybrid systems, battery technology, low voltage control systems, inverters and generators, and alternative transportation fuels

| Alignment of AG 171 to Program Learning Outcomes | Evaluate sustainable farming systems and business plan | Determine the sustainable farming system suited for a specific location in Hawaii | Recommend cultural practices, solve problems and cultivate horticultural crops in a sustainable manner based on sound biological and technological principles |
|-------------------------------------------------|-----------------------------------------------------|-----------------------------------------------------------------------------|
| Evaluate solar thermal applications, heating water, drying/cooking food products, running air conditioning systems and distilling water | X | |
| Evaluate solar thermal/photovoltaic systems | | X |
| Evaluate wind and Micro Hydroelectric systems | | X |
| Evaluate biomass systems, composting, agriculture wastes, ocean plants, feed stock, landfill implications, chemical processes and anaerobic digestion systems | | X |
| Evaluate hybrid systems, battery technology, low voltage control systems, inverters and generators, and alternative transportation fuels | | X |
AG 192  Special Topics 1-4 credits

A study of vegetable production in Hawaii. Students are expected to grow and harvest a vegetable crop.

- Identify the important concepts and facts for vegetable/fruit production in Hawaii
- Gain a higher appreciation for the human endeavor of vegetable/fruit production.
- Gain a higher awareness of the potential career paths in the agriculture industry
- Develop a comprehensive business plan for a vegetable/fruit business enterprise.

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<th>Alignment of AG 192 to Program Learning Outcomes</th>
<th>Evaluate sustainable farming systems and business plan</th>
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BUS 122B: Introduction to Entrepreneurship; Sustainable Agriculture 3 credits

This course is a specialized section of Introduction to Entrepreneurship that focuses on sustainable agriculture. The course will cover the basic economic and business principles regarding small-scale business enterprises connected to agriculture, with a particular focus on sustainable agriculture in Hawaii. With a focus on the creation of a business plan, topics include researching and
evaluating resources, planning, marketing, cultivating money resources, and understanding key concepts in law, budgeting, financial statements, and business documentation.

- Develop a comprehensive business plan for a future agriculture business
- Apply fundamental economic, financial, and organizational principles to the operation of a sustainable agriculture business.
- Work collaboratively in a group setting to cultivate entrepreneurship and develop solutions to economic issues.
- Apply general entrepreneurial concepts to sustainable agriculture practices in Hawaii.

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<th>Alignment of BUS 122B to Program Learning Outcomes</th>
<th>Evaluate sustainable farming systems and business plan</th>
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<td>Work collaboratively in a group setting to cultivate entrepreneurship and develop solutions to economic issues</td>
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**IS 201: The Ahupua'a 3 credits**

Study of the traditional Hawaiian approaches to natural resource development, utilization, exploitation, and management. The ahupua'a, as the traditional Hawaiian unit of land and sea subdivision, beginning in the upland forests, stretching across lower elevations, past the shoreline to the edge of the reef, will be evaluated as a microcosm of an integrated ecosystem and as a model for natural resource management and sustainability.

- Describe how the Hawaii's unique geological formation affects its sustainable natural resources.
- Describe how the ancient migration begins to affect the management of its natural resources and the socio-political fabric of the new land.
- Describe the agri-spiritual relationship between plant and mahi'ai; and the fish and the lawai'a.
- Discuss the ancient and present management value of water.
- Describe and assist in the reconstruction of lo'i kalo and loko i'a.
- Describe and discuss the current resources management practices, which augment or negate ancient practices.
- Research and replicate an artifact of his or her choice.

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Related Courses at Windward CC

There are no electives in the certificate. However, Windward Community College offers courses that are relevant to sustainable agriculture. These courses are not part of the certificate, but would be relevant to students seeking to expand their understanding of agriculture in Hawaii. The courses include:

- AG 132: Integrated Pest Management
- AQUA 106: Small Scale Aquaculture
- AQUA 106L: Small Scale Aquaculture Laboratory
- AQUA 201: The Hawai‘i Fishpond
- AQUA 201L: The Hawai‘i Fishpond Lab
- BOT 130: Plants in the Hawaiian Environment
  - and other Botany courses
- FSHN 185: Human Nutrition
- HWST 285: Lā‘au Lapa‘au I: Hawaiian Medicinal Herbs

Related Certificates at Windward CC

In addition to courses, there are certificates that are related to the proposed Certificate of Completion in Sustainable Agriculture. There is no significant overlap, although some of them share the same courses.

- Agriculture Technology - Certificate of Completion
- Agripharmatech - Certificate of Achievement

Related Programs and Organizations in Hawai‘i

The agriculture activities in Hawai‘i are tied together through organizations, government departments, and educational institutions.

University
- College of Tropical Agriculture and Human Resources (CTAHR)
  - Agribusiness Incubator Program: http://aip.hawaii.edu/
- Hawaii Community College Sustainable Agriculture
- Honolulu Community College Aquaponics
- Maui College Sustainable Agriculture
- Leeward Community College
  - Ma‘o Farms Certificate Program
  - Culinary program

Government
- Department of Agriculture
  - Farming incubation program
- Department of Land and Natural Resources (DLNR)
- Department of Education
Windward Organizations
Kako'o O'iwi - non-profit workforce development and wetland restoration
Kamehameha Schools – Punaluu
Associations
Hawaii Farm Bureau
Hawaii Aquaculture and Aquaponics Association
Hawaii Farmer's Union
Landholders
Kamehameha Schools
Campbell Estates
Castle Foundation

College Resources

The primary facilities used by the programs will be in already-existing classrooms and the college’s Shade House.

The instructors would be a combination of current faculty and outside experts in the discipline. No new positions are required.

Promoting the Certificate

The certificate will appeal to non-traditional students who are either already farming or who are interested in becoming farmers. A recent Agcurious seminar was held with 92 participants. A 5 session Agxposure series has 32 applicants. The certificate and individual would be promoted through already existing organizations such as the CTAHR and local farming associations.

The program would also be promoted at relevant events such as aquaponics workshops and the State farm fair.

Program Assessment

The success of the certificate program will be measured in three key ways: first, the number of students obtaining the certificate; second, the number students becoming farmers; and third, the number of non-certificate seeking students who take the specialized courses, indicating an increase in skills in the industry even though a certificate is not obtained.