

## University of Hawaii Maui College

### AQUA 362 - Aquaculture and Mariculture

- 1. Course Alpha. Please click on the ? to the right for help.**

AQUA

- 2. Course Number. Please click on the ? to the right for help.**

362

- 3. Course Title/Catalog Title. Please click on the ? to the right for help.**

Aquaculture and Mariculture

- 4. Number of Credits. Please click on the ? to the right for help.**

3

- 5. Contact Hours/Type. Please click on the ? to the right for help.**

- Hour lecture/lab (5)

2 hours lecture and 3 hours lab per week, which follows many of the upper-division UH-Hilo MARE courses .

- 6. Course Description. Please click on the ? to the right for help.**

Examines the principles and practices of aquaculture and mariculture as well as the historic and current status of aquaculture. Explores fish production, commercial species currently being cultivated, traditional Hawaiian aquaculture, water quality dynamics, aquaponics, and hatchery technology. Investigates aquaculture as a case study for global food production.

- 7. Pre-Requisites. Please click on the ? to the right for help.**

BIOL 171, CHEM 151 or 161 (or concurrent), and ZOOL 200, all with grade C or better; or consent.

**Co-requisites.**

- 9. Recommended Preparation.**

- 10. Is this a cross-listed course? Please click on the ? to the right for help.**

NO

- 11. Reason for Proposal. Why is this course being proposed or modified? This question requires specific information as part of the explanation. Please click on the ? to the right for help.**

The Sustainable Science Management (SSM) Bachelors in Applied Science degree is moving toward incorporating more natural science courses into the program. This course will be required in the SSM Program and could be used as an elective for other degrees as well. Aqua- and mariculture are emerging technologies especially on the Pacific islands and this course would provide a background for work in this field.

- 12. Effective Semester and Year. For new or modified courses, the effective year is one year from the semester proposed. For example, if proposed in Spring 2012, the effective semester is Spring 2013. Please click on the ? to the right for help.**

Fall 2014

- 13. Grading Method. What grading methods may be used for this course? Please click on the ? to the right for help.**

- Standard (Letter,Cr/NCr,Audit) (0)

- 14. Is this course repeatable for credit? How often can this course be counted toward a degree or certificate? Please click on the ? to the right for help.**

NO

- 15. Course Student Learning Outcomes (SLOs). DO NOT ENTER TEXT IN THE TEXT BOX BELOW. Click on the yellow button**

"COURSE LEARNING OUTCOMES" and enter in that screen. Please click on the ? to the right for help.

<b>Course SLO/Competency</b>	Explore and explain the use of basic aquaculture and mariculture tools, practices, techniques, and related technologies	Identify species used in aquaculture and mariculture and consider the practical aspects of culturing them in Hawaii	Analyze the economic potential of various types of aquaculture and mariculture practices and technologies for use in Hawaii and evaluate environmental impacts of each	Explore and discuss the role of aquaculture and mariculture in world food production and food security	Examine and discuss peer-reviewed articles and other technical aquaculture and mariculture publications
Explain and demonstrate the basic scientific principles of aquaculture and mariculture techniques,	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Apply skills and knowledge for the construction and management of small mariculture, aquaculture, or aquaponics production unit.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

<b>Course SLO/PSLO</b>	Examine the features and functions of multiple systems and how they are interconnected, and explains how one system can be optimized without degrading other systems or depleting natural resources;	Investigate, discover, and summarize federal, state, local, and industry codes, standards, laws, regulations, and guidelines.	Assess the feasibility of investing in sustainability measures using simple payback, return on investment, and life cycle costing techniques.	Describe the unique sustainability challenges faced by island communities.	Identify, outline, and illustrate the fundamentals of existing and emerging technologies in energy production, distribution, and management; water supply; wastewater treatment; and waste management; their applications, processes, and requirements.	Appraise, evaluate, summarize, and explain the economic, social, cultural, political, and scientific features that make a system, process, practice, or business sustainable and consolidate that information into a sustainability profile.	Propose and justify creative solutions to sustainability challenges that are scientifically sound.	Demonstrate skills related to managing sustainability projects including defining scope, selecting achievable goals, evaluating ethical implications, working with diverse teams, making presentations, and preparing reports.
Explain and demonstrate the basic scientific principles of aquaculture and mariculture techniques,	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Apply skills and knowledge for the construction and management of small mariculture, aquaculture, or aquaponics production unit.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

16. Course Competencies. DO NOT ENTER TEXT IN THE TEXT BOX BELOW. Click on the yellow button "COURSE COMPETENCIES/ISSUES/SKILLS" and enter text in that screen. Course competencies are smaller, simpler tasks that

connect to and facilitate the SLUs.

Competency
Explore and explain the use of basic aquaculture and mariculture tools, practices, techniques, and related technologies
Identify species used in aquaculture and mariculture and consider the practical aspects of culturing them in Hawaii
Analyze the economic potential of various types of aquaculture and mariculture practices and technologies for use in Hawaii and evaluate environmental impacts of each
Explore and discuss the role of aquaculture and mariculture in world food production and food security
Examine and discuss peer-reviewed articles and other technical aquaculture and mariculture publications

**17. Recommended Course Content and Timeline. The course content facilitates the course competencies. Course content may be organized by weeks, units, topics or the like.**

Content
Week 1: Introduction to aquaculture and the world aquaculture prospective
Week 2: Traditional Hawaiian aquaculture and the ahupua system
Week 3: Water quality dynamics
Week 4: Pond aquaculture
Week 5: Aquaculture systems
Week 6: Limu/seaweeds
Week 7: Nutrition and growth
Week 8: Shellfish culture
Week 9: Breeding aquairum species
Week 10: Shrimp aquaculture
Week 11: Fish and tilapia culture
Week 12: Sanitation and aquaculture economics
Week 13: Aquaculture and the environment / best management practices
Weeks 14-16: Project presentations

**18. Program Learning Outcomes. DO NOT ENTER TEXT IN THE TEXT BOX BELOW. Click on the yellow button "PLOs" and enter text in that screen. Program Student Learning Outcomes (PLOs) supported by this course. If you are not a "program" use the Liberal Arts PLOs, view them by clicking on ? icon to the right.**

Program SLO
Examine the features and functions of multiple systems and how they are interconnected, and explains how one system can be optimized without degrading other systems or depleting natural resources;
Investigate, discover, and summarize federal, state, local, and industry codes, standards, laws, regulations, and guidelines.
Assess the feasibility of investing in sustainability measures using simple payback, return on investment, and life cycle costing techniques.
Describe the unique sustainability challenges faced by island communities.
Identify, outline, and illustrate the fundamentals of existing and emerging technologies in energy production, distribution, and management; water supply; wastewater treatment; and waste management; their applications, processes, and requirements.
Appraise, evaluate, summarize, and explain the economic, social, cultural, political, and scientific features that make a system, process, practice, or business sustainable and consolidate that information into a sustainability profile.
Propose and justify creative solutions to sustainability challenges that are scientifically sound.
Demonstrate skills related to managing sustainability projects including defining scope, selecting achievable goals,

evaluating ethical implications, working with diverse teams, making presentations, and preparing reports.

19. **College-wide Academic Student Learning Outcomes (CASLOs).** FIRST, fill out the CASLO grid located in the UHMC tab above. Click on the HELP icon for tips on determining support for the CASLOs and indicate your choices below by clicking on the box in front of each supported CASLO. NOTE: Our campus does not use the Preparatory Level, Level 1 and Level 2 designations in the chart below.

	<b>Creativity</b> - Able to express originality through a variety of forms.
<input checked="" type="checkbox"/>	<b>Critical Thinking</b> - Apply critical thinking skills to effectively address the challenges and solve problems. <input checked="" type="checkbox"/> Preparatory Level
<input checked="" type="checkbox"/>	<b>Information Retrieval and Technology</b> - Access, evaluate, and utilize information effectively, ethically, and responsibly. <input checked="" type="checkbox"/> Preparatory Level
<input checked="" type="checkbox"/>	<b>Oral Communication</b> - Practice ethical and responsible oral communications appropriately to a variety of audiences and purposes. <input checked="" type="checkbox"/> Preparatory Level
<input checked="" type="checkbox"/>	<b>Quantitative Reasoning</b> - Synthesize and articulate information using appropriate mathematical methods to solve problems of quantitative reasoning accurately and appropriately. <input checked="" type="checkbox"/> Preparatory Level
<input checked="" type="checkbox"/>	<b>Written Communication</b> - Write effectively to convey ideas that meet the needs of specific audiences and purposes. <input checked="" type="checkbox"/> Preparatory Level

GenED SLO
Critical Thinking - Apply critical thinking skills to effectively address the challenges and solve problems.
Information Retrieval and Technology - Access, evaluate, and utilize information effectively, ethically, and responsibly.
Oral Communication - Practice ethical and responsible oral communications appropriately to a variety of audiences and purposes.
Quantitative Reasoning - Synthesize and articulate information using appropriate mathematical methods to solve problems of quantitative reasoning accurately and appropriately.
Written Communication - Write effectively to convey ideas that meet the needs of specific audiences and purposes.

20. **Linking.** CLICK ON CHAIN LINK ICON IN UPPER RIGHT HAND CORNER TO BEGIN LINKING. Please click on the ? to the right for help.

21. **Method(s) of delivery appropriate for this course.** Please click on the ? to the right for help.

- Classroom/Lab (0)
- Hybrid (0)

22. **Text and Materials, Reference Materials, and Auxiliary Materials.** Please click on the ? to the right for help.

Possible textbooks could include  
Landau, Matthew. Introduction to Aquaculture  
Timmons, M.B and J.M. Ebling. Recirculating Aquaculture

Articles will be selected from aquaculture journals

23. **Maximum enrollment.** Please click on the ? to the right for help.

**24. Particular room type requirement. Is this course restricted to particular room type? Please click on the ? to the right for help.**

YES

Uke Le`a 115, Marine Program Lab

**25. Special scheduling considerations. Are there special scheduling considerations for this course? Please click on the ? to the right for help.**

NO

**26. Are special or additional resources needed for this course? Please click on the ? to the right for help.**

NO

**27. Does this course require special fees to be paid for by students? Please click on the ? to the right for help.**

NO

**28. Does this course change the number of required credit hours in a degree or certificate? Please click on the ? to the right for help.**

NO

**29. Course designation(s) for the Liberal Arts A.A. degree and/or for the college's other associate degrees. Please click on the ? to the right for help.**

Degree	Program	Category
Associate in Arts:	Liberal Arts	LE - Elective
AS:	ANY	NS - Natural Science
AAS:	ANY	NS - Natural Science
BAS:	Other	CR - Core Course/Requirement - BAS
Developmental/ Remedial:		

Liberal Arts AA degree elective, 3 credits, DB (2 credits) and DY

**30. Course designation(s) for other colleges in the UH system.**

UH System - DB (2 credits) and DY (1 credit)

**31. Indicate the year and page # of UHMC catalog referred to. For new or modified courses, please indicate the catalog pages that need to be modified and provide a sheet outlining those changes.**

2013-14

pages 17, SSM degree requirement

pages 94-95, New alpha Aquaculture and course description

**32. College-wide Academic Student Learner Outcomes (CASLOs). Please click on the HELP icon for more information.**

<b>Standard 1 - Written Communication</b> Write effectively to convey ideas that meet the needs of specific audiences and purposes.		
<b>Outcome 1.1 - Use writing to discover and articulate ideas.</b>		2
<b>Outcome 1.2 - Identify and analyze the audience and purpose for any intended communication.</b>		2
<b>Outcome 1.3 - Choose language, style, and organization appropriate to particular purposes and audiences.</b>		2
<b>Outcome 1.4 - Gather information and document sources appropriately.</b>		2
<b>Outcome 1.5 - Express a main idea as a thesis, hypothesis, or other appropriate statement.</b>		2

<b>Outcome 1.6 - Develop a main idea clearly and concisely with appropriate content.</b>	2
<b>Outcome 1.7 - Demonstrate a mastery of the conventions of writing, including grammar, spelling, and mechanics.</b>	2
<b>Outcome 1.8 - Demonstrate proficiency in revision and editing.</b>	2
<b>Outcome 1.9 - Develop a personal voice in written communication.</b>	0
<b>Standard 2 - Quantitative Reasoning</b> Synthesize and articulate information using appropriate mathematical methods to solve problems of quantitative reasoning accurately and appropriately.	
<b>Outcome 2.1 - Apply numeric, graphic, and symbolic skills and other forms of quantitative reasoning accurately and appropriately.</b>	3
<b>Outcome 2.2 - Demonstrate mastery of mathematical concepts, skills, and applications, using technology when appropriate.</b>	2
<b>Outcome 2.3 - Communicate clearly and concisely the methods and results of quantitative problem solving.</b>	2
<b>Outcome 2.4 - Formulate and test hypotheses using numerical experimentation.</b>	3
<b>Outcome 2.5 - Define quantitative issues and problems, gather relevant information, analyze that information, and present results.</b>	2
<b>Outcome 2.6 - Assess the validity of statistical conclusions.</b>	2
<b>Standard 3 - Information Retrieval and Technology.</b> Access, evaluate, and utilize information effectively, ethically, and responsibly.	
<b>Outcome 3.1 - Use print and electronic information technology ethically and responsibly.</b>	2
<b>Outcome 3.2 - Demonstrate knowledge of basic vocabulary, concepts, and operations of information retrieval and technology.</b>	1
<b>Outcome 3.3 - Recognize, identify, and define an information need.</b>	3
<b>Outcome 3.4 - Access and retrieve information through print and electronic media, evaluating the accuracy and authenticity of that information.</b>	3
<b>Outcome 3.5 - Create, manage, organize, and communicate information through electronic media.</b>	2
<b>Outcome 3.6 - Recognize changing technologies and make informed choices about their appropriateness and use.</b>	1
<b>Standard 4 - Oral Communication</b> Practice ethical and responsible oral communications appropriately to a variety of audiences and purposes.	
<b>Outcome 4.1 - Identify and analyze the audience and purpose of any intended communication.</b>	2
<b>Outcome 4.2 - Gather, evaluate, select, and organize information for the communication.</b>	2
<b>Outcome 4.3 - Use language, techniques, and strategies appropriate to the audience and occasion.</b>	3
<b>Outcome 4.4 - Speak clearly and confidently, using the voice, volume, tone, and articulation appropriate to the audience and occasion.</b>	3
<b>Outcome 4.5 - Summarize, analyze, and evaluate oral communications and ask coherent questions as needed.</b>	2
<b>Outcome 4.6 - Use competent oral expression to initiate and sustain discussions.</b>	1
<b>Standard 5 - Critical Thinking</b> Apply critical thinking skills to effectively address the challenges and solve problems.	

<b>Outcome 5.1 - Identify and state problems, issues, arguments, and questions contained in a body of information.</b>		3
<b>Outcome 5.2 - Identify and analyze assumptions and underlying points of view relating to an issue or problem.</b>		2
<b>Outcome 5.3 - Formulate research questions that require descriptive and explanatory analyses.</b>		3
<b>Outcome 5.4 - Recognize and understand multiple modes of inquiry, including investigative methods based on observation and analysis.</b>		3
<b>Outcome 5.5 - Evaluate a problem, distinguishing between relevant and irrelevant facts, opinions, assumptions, issues, values, and biases through the use of appropriate evidence.</b>		3
<b>Outcome 5.6 - Apply problem-solving techniques and skills, including the rules of logic and logical sequence.</b>		2
<b>Outcome 5.7 - Synthesize information from various sources, drawing appropriate conclusions.</b>		2
<b>Outcome 5.8 - Communicate clearly and concisely the methods and results of logical reasoning.</b>		2
<b>Outcome 5.9 - Reflect upon and evaluate their thought processes, value system, and world views in comparison to those of others.</b>		2
<b>Standard 6 - Creativity</b> Able to express originality through a variety of forms.		
<b>Outcome 6.1: Generate responses to problems and challenges through intuition and non-linear thinking.</b>		1
<b>Outcome 6.2: Explore diverse approaches to solving a problem or addressing a challenge.</b>		3
<b>Outcome 6.3: Sustain engagement in activities without a preconceived purpose.</b>		1
<b>Outcome 6.4: Apply creative principles to discover and express new ideas.</b>		1
<b>Outcome 6.5: Demonstrate the ability to trust and follow one's instincts in the absence of external direction</b>		1
<b>Outcome 6.6: Build upon or adapt the ideas of others to create novel expressions or new solutions.</b>		2

### 33. Additional Information

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