AUTHORIZATION TO PLAN AN ACADEMIC PROGRAM
Associate of Science (A.S.) in Natural Science (N.S.)
with a Concentration in Marine Science

Kaua‘i Community College
Division of Science and Mathematics

1. Vice Chancellor for Academic Affairs James Dire was consulted by the proposers. He is on the planning committee.

2. Campus, College, and Division requesting the ATP:
Kaua‘i Community College (KCC, hereafter) Division of Science and Math

3. Planning Committee:
Chair, Stephen Taylor, Instructor of Physical Science
Terry Bruns, Instructor of Biological Science
James Dire, Vice Chancellor of Academic Affairs
Michael Hannawald, Instructor of Physical Science
Sharadchandra Marahatta, Instructor of Biological Science
Brian Yamamoto, Professor of Biological Science

4. Proposed Program:
Associate of Science in Natural Science (ASNS) with Concentration in Marine Science

5. Description of Need for the Program:
The purpose of the Associate of Science in Natural Science (ASNS) degree is to address the needs of students interested in science, technology, engineering, and mathematics (STEM). Students can use the AS degree in Natural Science to better market their science background or in preparation for transfer to a Bachelor of Science program at a four year institutions.

Students enrolled at the college have continually expressed an interest in getting an AS degree at KCC. Capable and interested high school students bypass KCC because such a pathway to a BS degree is not available. Simply having the program in place allows students to more easily follow pathways towards their desired degree. Furthermore, the program will fulfill campus and UH system STEM initiative goals.

1) Learning Outcomes

A. PROGRAM LEARNING OUTCOMES
Students should be able to:
1. Explain the natural and technological world using reflection and quantitative analysis to prepare a plan; to collect, process, and interpret data; to communicate conclusions; and to evaluate the plan, procedures and findings.
2. Express scientific knowledge and understanding to different audiences for a range of purposes.
3. Apply scientific knowledge, skills, and understandings to issues in daily life.
4. Articulate the ethical issues of the impact on people and on the local and global environment of the processes and likely products of science.
5. Relate how the physical environment of Earth and its position in the universe impacts the way we live.
6. Relate the scientific concept of energy to our existence and quality of life.
7. Explain the interdependence of their own biology and that of other living things.

B. LEARNING OUTCOMES UNIQUE TO A CONCENTRATION IN MARINE SCIENCE
Students should be able to:
1. Articulate essential underlying facts, concepts, principles, theories, and applications relating to chosen areas in marine science.
2. Apply terms, conventions and units of measurement appropriate to marine science.
3. Employ the language and techniques of mathematics that are used in marine science.
4. Apply contributions made by marine science to informed debate, including some of the limits of current scientific knowledge.
5. Relate scientific knowledge and understanding to address familiar and unfamiliar situations in order to plan and carry out project work.
6. Apply mathematical language and techniques to understand phenomena and solve problems in marine science.
7. Assess information using scientific theories and concepts from a range of sources in order to make sound judgments.
8. Design safe, practical, investigative work in marine science that reflects risk management and appropriate style, purpose, and audience awareness.
9. Apply appropriate qualitative and quantitative methods to acquire, record and analyze data from laboratory and field observations and measurements, and to interpret and report results in terms of underlying theory, practical issues and relevant information from other sources.
10. Work collaboratively with others to explore aspects of marine science.

2) Justification
A prospective program in marine science is justified by connecting the needs of our students with the community, local businesses, domestic and international partner organizations, and existing faculty throughout the UH system.

Student interest in marine science: Sections of OCN 201: Science of the Sea consistently fulfill capacity enrollment with waitlists. High student demand for the two full sections taught in the 2010-2011 academic year prompted KCC to offer more sections. Three sections filled to capacity this academic year (2011-2012). Students are particularly interested in marine biology. The majority of OCN 101: Intro to the Marine Option Program student proposals focus on marine biology. International students from the Japanese Maritime Colleges and international sister colleges will appreciate educational opportunities with our expanded marine science program.

Student interest in an Associate of Science and Bachelor of Science: Several students have expressed frustration with the inability to complete an Associate of Science or Bachelor of Science degree at KCC. The AS degree at KCC is a pathway toward BS degrees in Marine
Biology at UH Manoa, Marine Science at UH Hilo, or any other institution offering baccalaureate degrees. The idea of completing an AS degree on-island to save money in tuition fees before transferring is an attractive one for our high school students. Lack of an Associate of Science pathway discourages students to pursue a STEM degree. It may even discourage them from doing so. The only current degree option is an Associate of Arts in Liberal Arts, other than CTE associate degrees. Campus and UH System STEM initiative goals suggest each campus should be doing more to encourage STEM enrollment and STEM degrees.

Community, partner, and local business interest in Marine Science at KCC:
Eyes on the Reef, Hawaiian Islands Humpback Whale National Marine Sanctuary, Kīlauea Point National Wildlife Refuge, Surfrider Foundation, Pacific Missile Range Facility, Kauai Marine Mammal Response Program, and local dive shops have all approached the school or KCC faculty seeking students, and in some cases employees, for their work in the field of marine science. The National Oceanic and Atmospheric Administration (NOAA) entered into a Memorandum of Agreement partnership with KCC in Fall 2011 in hopes of facilitating collaboration on educational and community outreach. A marine biologist at KCC will be in a better position to get the most out of the agreement because the majority of opportunities for collaboration involve marine biology. NOAA has offered $10,000 to KCC specifically for marine biology equipment because they feel students and the community would benefit from the educational opportunities. NOAA has also offered to donate a small boat to the school, should we want one. KCC has received a Rural Development Program grant of $60,000 to support marine science education. The grant was funded through the department of labor with the specific goal of helping students gain skills needed for local and state jobs.

Campus and faculty interest in marine science at KCC:
Current physical science faculty at KCC are particularly interested in expanding the existing oceanography offerings. Creation of an ASNS with concentration in Marine Science would take advantage of current faculty and administration expertise. Steve Taylor holds a Ph.D. in physical oceanography. VCAA James Dire hold a Ph.D. in earth and planetary sciences and taught for 15 years in a marine science program. The campus will renovate classroom space with a specific purpose of making it suitable for marine biology lab courses. Renovation plans predate the ATP by several years. The plans have already been approved by the campus and the funds in place. The renovation will likely be completed by the fall 2012 semester. Faculty with marine science backgrounds throughout the UH system have expressed an interest in an expanded marine science program at KCC, including UH-Manoa, UH-Hilo, Hawaii CC, Honolulu CC, Leeward CC, Windward CC, and UH Maui College. Faculty at the Japanese Maritime Colleges and in the Earth and Ocean Sciences department at the University of British Columbia (UBC) expressed interest in collaboration with our expanded marine science program at KCC. Representatives of the Japanese Maritime Colleges have been to KCC on multiple occasions. Dr. Taylor has visited UBC and a faculty member from UBC’s Department of Earth and Ocean Sciences will visit KCC in winter 2012.

3) Impact on campus, island and/or the state’s economic development
A 2007 publication from the National Academy of Sciences, “Rising Above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future” describes how increasing the size of the nation’s workforce skilled in STEM fields is an important key to our
nation’s economic future. Hawaii is no exception in this regard. That is why our campus, UH system, and state (e.g. ACT 111) have put forth initiatives to promote STEM education.

4) How the program addresses workforce needs.
Overall U.S. unemployment remains relatively high, yet STEM industries are an exception. A 2008 study by the Interagency Aerospace Revitalization Task Force (available online) echoed the 2007 National Academies publication: graduates with STEM degrees are in demand. But, the current rate of graduates in STEM fields is projected to fall far short of impending demand.

The impact on local workforce needs can be inferred from students passing through KCC’s Marine Option Program, which was recently restarted at our campus in the last few years. Several of the students taking the OCN 101: Introduction to the Marine Option Program course have been employed in various marine-related employment on-island including a dive master, boat captain, field researcher, and the founder of a successful ocean-related non-profit. We anticipate the AS will help train our students to capably fulfill similar workforce needs. For example, the National Oceanic and Atmospheric Administration has been working with our campus and community on a Discovery Center. It is hoped students from our ASNS program will eventually find employment at the center.

5) How program aligns with system and campus mission and strategic plan and outcomes.
Creating an AS in Natural Science will help fulfill the UH System and KCC campus Strategic Plan goal and outcome of “increasing degree completion in STEM fields.” It may also fulfill the two more goals and outcomes: increasing degrees completed, increasing degrees in programs that lead to occupations where the wage is above the US average, and increasing the number of students transferring to UH Manoa, UH Hilo, and UH West Oahu.

The second sentence on the UHCC system webpage states: “All [Community College campuses] offer liberal arts and sciences courses for students preparing to transfer to baccalaureate institutions...”. The present ATP, then follows directly from UHCC’s fundamental purpose by helping to prepare science students to transfer to baccalaureate institutions.

b. Can identified need be met by existing program(s)?

1) List similar degrees or certificates offered in the UH System.
Kapi‘olani CC, Leeward CC, and UH Maui College currently offer AS degrees in natural science. UH Manoa offers BS in Marine Biology and UH Hilo offers a BS in Marine Science.

2) Describe the impact of the proposed program on current courses or programs at the campus and within the system.
An ASNS with concentration in marine science would improve diversity and depth of science courses at the local KCC campus. Students would be able to take at least eight additional courses specifically geared for science majors. Degree requirements would likely boost otherwise small enrollment college algebra, calculus, and introductory chemistry for science majors. KCC students who transfer to UH Manoa and UH Hilo could back transfer their courses to get an ASNS with a concentration in Marine Science at KCC.
3) If a similar program exists, consult with other campuses, identifying who and when.
The curriculum for the proposed AS degree with concentration in marine science was specifically designed to facilitate a pathway for students to complete BS degrees in Marine Biology at UH Manoa and Marine Science at UH Hilo. The application for the ATP is done in consultation with other UH CC campuses.

a) VCAA to VCAA communication
The VCAA of KCC consulted with the VCAA of UH Hilo on Jan. 25, 2012.

b) faculty to faculty communication.
Dr. Taylor of Kauai Community College discussed plans for an AS degree in Natural Science with concentration in marine science with Professor Jane Schoonmaker of the Oceanography department at UH Manoa on Jan 23, 2012 and John Coney of the Marine Science department at UH-Hilo on Jan 24, 2012.

6. Planning the new program
a. Planning period. Describe the…
1) Planning period
A planning period will begin in summer 2012 and end in fall semester 2013.

2) Activities to be undertaken during the planning period.
The following activities must be undertaken during the planning period: hire new faculty member, develop core curriculum, develop concentration curriculum required and elective courses and other requirements, develop new course offerings, collaborate with other campuses on curriculum and courses, develop articulation agreements, achieve appropriate campus approvals.

3) Anticipated submission date of program proposal
It is anticipated the proposal will be submitted during fall semester of 2013.

4) Workload/budget implications during the planning period
A new hire in marine biology for fall 2012 will be paid using private outside funding. The new hire will be involved in planning, thus keeping system funding of assigned time for planning by existing faculty to a minimum.

5) How will the program be economically sustainable?
The program will be sustained economically through enrollment. Please refer to Table 1.1 on page 7. Startup costs and low initial enrollment are a common barrier to implementing new programs. Previously approved funding and outside funding have resolved initial expense challenges. A building renovation request from several years ago to provide the appropriate lab space has already been approved in the budget and construction will begin in 2012. Equipment funding has been secured through Rural Development Project and National Oceanic and Atmospheric Administration. Private philanthropists have donated three years of funding for a new hire in marine biology. Existing faculty can already cover courses that overlap with other existing programs and degrees.
6) **Impact of the program on accreditation**
Accreditation will not be impacted in any new way. Kauai Community College already offers AS degrees in trade technologies. Kapi‘olani already offers AS degrees in natural science. The program to be proposed is consistent with the colleges existing status in regards to accreditation.

7) **How will the program fit within campus and/or system organizational structure?**
The AS in natural science is consistent with courses offered already but provides a degree and clear pathway to transfer to BS programs, especially UH Manoa marine biology and UH Hilo marine science.

b. **Description of resources required:**
1) **Faculty**
The required expertise comes predominantly from existing faculty teaching existing courses. One new hire with specialty in marine biology is planned. Existing faculty include five full-time science faculty with expertise in botany and plant sciences, chemistry, climate and atmospheric sciences, microbiology, physical oceanography, physics, and zoology. The Science and Math Division is bolstered by three full-time faculty, each of whom teaches first-year calculus. The campus has made it a priority to add another full time math faculty member soon.

2) **Library resources**
Current library resources in the UH system are sufficient. Access from the Kauai Community College campus to similar resources enjoyed by UH Hilo or UH Manoa may benefit. Needs for library resources will be explored in planning for the proposal.

3) **Physical resources**
Existing chemistry, biology, and physics lab and classroom facilities are efficiently used such that a limited amount of additional classroom, lab facilities and equipment are needed. Funding for classroom space and equipment has already been secured.

4) **Other resources required**
No other resources are projected at this time. Other resources may provide benefit as the program grows.

c. **Fiver-Year Business Plan**
1) & 2) Annual costs, enrollment, and estimated tuition revenue appear in Table 1.1.

3) & 4) **How will the program be funded; are funds included or requested?**
As discussed in item 6.a.5) on page 5, the program is funded by outside funds and tuition.

5) **Given a “flat budget” situation or if anticipated enrollment does not materialize, how will the proposed program be funded?**
Should enrollment not materialize, equipment expenses will not be accrued in years 4 and 5. Existing funds, as budgeted in Table 1.1, are sufficient to cover expenses. Faculty could also concentrate of other campus priorities and courses by, for instance, teaching math and science courses in the liberal arts program that are currently taught by lecturers.
TABLE 1.1 Five Year Business Plan

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<td>1Faculty w/o fringe</td>
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<td>Library</td>
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1 Estimated assuming combined faculty efforts on program-specific required courses and responsibilities amount to 60% of the effort of one full-time faculty member.
2 A private donor has committed to three years of full-time salary with fringe (estimated as $185,000 w/o fringe); Outside equipment funds are roughly $50,000; these quantities are distributed equally over the 5 years.

7. Describe the impact on current courses or programs.
An ASNS with concentration in marine science would improve diversity and depth of science courses at the local KCC campus. Students would be able to take at least eight additional courses specifically geared for science majors. Degree requirements would likely boost otherwise small enrollment college algebra, calculus, and introductory chemistry for science majors. KCC students who transfer to UH Manoa and UH Hilo could back transfer their courses to get an ASNS with a concentration in Marine Science at KCC.

8. If the curriculum includes courses that are offered at other UH campuses, describe how articulation of these courses will be assured prior to the program proposal submission.
Curriculum and courses will be developed in collaboration with other UH campuses. Articulation agreements will be developed during the planning period.

9. If this program is multidisciplinary, provide evidence of commitment for support from the colleges, departments, programs and/or individuals expected to participate.
N/A.
The ATP has completed the campus approval process prior to review by Council of Chief Academic Officers.

Reviewed by:

Campus Chief Academic Officer: _ Recommend

Comments:

Chancellor

Approved ___ Disapproved

Comments:

(A copy of the signed document is provided to the Office of the Executive Vice President of Academic Affairs/Provost.)