September 21, 2006

MEMORANDUM

TO: Kitty Lagareta
Chairperson, Board of Regents

VIA: David McClain
President

FROM: Rose Tseng
Chancellor, University of Hawai`i at Hilo

SUBJECT: **Change in Status from Provisional to Established for the Bachelor of Arts Degree in Geology at the University of Hawai'i at Hilo**

SPECIFIC ACTION REQUESTED

It is requested that the Board of Regents approve the change of status from provisional to established for the Bachelor of Arts Degree in Geology at the University of Hawai'i at Hilo (UH Hilo).

RECOMMENDED EFFECTIVE DATE

Upon approval.

ADDITIONAL COST

The Bachelor of Arts Degree in Geology required no additional cost to implement and there will be no additional cost upon conversion to established status.

PURPOSE

The Bachelor of Arts Degree in Geology is in its fifth year and subject to approval or discontinuance under Board of Regents Policy 5-1 a.(3).

BACKGROUND

The Geology Department previously offered only a Bachelor of Science degree in Geology with strong mathematics and physics components, designed for students planning to pursue graduate degrees.

The Bachelor of Arts degree was added to attract students who plan to pursue teacher certification, scientific/technical writing, hydrology, technical earth science positions (volcano monitoring, environmental science, geographical information systems, surveying and geodesy) and other jobs that require only a Bachelors Degree. Graduates with the B.A. degree are also more likely to be retained in the local workforce. The degree was designed to be more flexible and allow students to tailor a degree combining a strong liberal arts background with rigorous science training. It supports the UH Hilo mission of using the Big Island as a living laboratory and of involving students in hands-on learning. It also makes the study of geology more accessible to more students by reducing somewhat the level of mathematics, broadening the number of interdisciplinary science courses, and increasing the number of elective hours. The Bachelor of Arts degree also encourages students to broaden their study of other sciences.

Curriculum: The requirements for the Bachelor of Arts in Geology may be summarized as follows:

- four foundation courses in geology (plus laboratory courses)
- one introductory course in either marine science or astronomy
- two upper division geology courses selected from subjects taught in traditional geology curriculum
- six upper-division elective courses in geology or closely related disciplines (two of these six may be selected from earth science courses in closely-related disciplines)
- a senior seminar series
- one course each in calculus, chemistry and physics (plus laboratory courses)

The required courses add up to 45 credits in geology and closely-related disciplines and 11 credits of supplementary (math, chemistry, and physics) courses. In comparison, the Bachelor of Science degree requires 42 credits in geology and 31 credits of supplementary courses. There have been no changes to the core curriculum for the Bachelor of Arts Degree in Geology since it was awarded provisional status by the Board of Regents.

Students in the B.S. program take several upper-division courses not required of students in the B.A. On the other hand, students working towards their Bachelor of Arts degree are able to take a larger number of courses in English, the Humanities, Social Sciences, and other Natural Sciences than in the Geology Bachelor of Science program. Such breadth is especially desirable in the education of teachers, technical positions, and other jobs in the local workforce that do not require going on to graduate school to obtain an advanced degree.

Resource Requirements: No additional resources have been required for implementation of the B.A. degree. The curriculum includes only existing courses and students in the B.A. may take fewer 400-level geology courses than those working for their B.S. degree if they choose to substitute science courses from other disciplines. Required lower-division courses in math, physics and chemistry are also required for other majors, but the relatively small numbers of geology majors will have only a modest impact on those courses. Having additional majors within upper division geology courses increases the cost effectiveness of these course offerings.

Student Enrollment, Graduation, and Employment: Enrollments in the Geology Program at UH Hilo have reached all time highs due in part to the implementation of the Geology B.A. degree option. In 2000-01, we had 17 majors and this has increased to 32 as of 2005-06 with nine of these having declared a Geology B.A. major. Likewise numbers of graduating Geology majors have increased from an average of four to five per year to an all time high of 11 in the 2005-06 year with three of these being Geology B.A. recipients. As time progresses, we anticipate an increased percentage of degrees being awarded to Geology B.A. students.

To date we have had five graduates from the Geology B.A. program, four of which are employed or in school and one is deceased. Out of the four graduates, two are employed in geotechnical positions on the Big Island and one of these, Kevan Kamibayashi, has a permanent position at the Hawaiian Volcano Observatory. We are particularly proud of Kevan's achievements as the Geology Department faculty mentored him as a seventh grade Na Pua No`eau student and he returned to follow his goal of working on the active volcanoes of the Big Island. The third student is currently enrolled in the UH Hilo Teacher Education Program. The only student not retained in the local workforce is currently working as a Geographic Information Specialist in the petroleum industry in Texas.

ACTION RECOMMENDED

It is recommended that the Board of Regents approve the change of status from provisional to established for the Bachelor of Arts Degree in Geology at the University of Hawai`i at Hilo.

Attached are the Self-Study Program Review and Academic Program Cost and Revenues for the Bachelor of Arts Degree in Geology.

Attachments

C: Executive Administrator and Secretary of the Board

Self-Study for the Bachelor of Arts Degree in Geology

at the University of Hawai‘i at Hilo

1. Is the Geology B.A. degree program organized to meet its objectives?

The Bachelor of Arts in Geology program is designed to provide a more flexible degree program for students wishing to enter the fields of education and geotechnical work that do not require advanced degrees. The purpose of the B.A. degree is to create an alternate track to complement the existing Bachelor of Science in Geology degree that requires substantially more mathematics, physics, and chemistry as preparation for graduate school. The core courses required for the Bachelor of Arts degree were chosen to give our graduates both a solid foundation in earth science and the flexibility to design a more interdisciplinary degree that matches their career goals.

The Bachelor of Arts degree is still rigorous enough to fulfill the physical science requirements necessary for secondary education and to be employed in geotechnical fields. However, it also allows the students to develop a more interdisciplinary background that is useful in teaching, geotechnical, and environmental fields. Students who graduate from this program are more likely to enter the local workforce and economy, while students in the Bachelor of Science program tend to leave Hawai`i to pursue opportunities in graduate school.

Degree Requirements for the Bachelor of Arts in Geology

A. Courses in Geology **(42 credits)(or 36 credits if student elects to substitute earth science courses from closely-related disciplines)**

- GEOL 111-111L Physical Geology with Lab (4)
- GEOL 112-112L Historical Geology with Lab (4)
- GEOL 212 Mineralogy (4)
- GEOL 320 Petrology (4)
- GEOL 495A-495B Seminar (2)
- Two of the following courses:

  GEOL 330 Structural Geology (3)
  GEOL 340 Stratigraphy and Sedimentology (3)
  GEOL 342 Geomorphology (3)
  GEOL 370 Field Methods (3)

- Six additional geology courses numbered 300 and above (totaling at least 18 credits). Up to two of these courses may be substituted from the list in part B.

B. Earth-Science Courses from Closely-Related Disciplines (3 credits)
(or 9 credits if student elects to substitute earth science courses for geology courses)

- MARE 201 or ASTR 180 Oceanography or Principles of Astronomy (3)
- Students may substitute up to two of the following courses for upper division geology electives:

GEOG 300	Climatology (3)
GEOG 319	Natural Hazards and Disasters (3)
GEOG 470	Remote Sensing and Air Photo Interpretation (3)
MARE 360	Marine Resources (3)
MARE 425	Chemical Oceanography (3)
MARE 461	Marine Geology (3)
SOIL 304	Tropical Soils (3)
SOIL 401	Soil Classification (3)
SOIL 461	Soil Conservation and Water Quality (3)

C. Supplemental Courses (11 credits)

- CHEM 114-114L Introductory Chemistry with Lab (3+1)
- PHYS 106-170L Introductory Physics with Lab (3+1)
- MATH 115 Applied Calculus (3)

Note: Students may substitute more rigorous courses. Chem 124-124L may substitute for Chem 114-114L; Phys 170 may substitute for Phys 107, and Math 205 may substitute for Math 115)

Additional Requirements

1. Complete general education requirements, complete 120 hours, satisfy the writing intensive requirement, and satisfy the Hawaiian/Asian/Pacific Requirement;
2. Complete at least 34 credits numbered 300 and above; and
3. Complete required courses listed in parts A, B, and C with a grade of □C□ (2.0) or better.

The required courses add up to 45 credits in geology and closely-related disciplines and 11 credits of supplementary (math, chemistry, and physics) courses. In comparison, the Bachelor of Science degree requires 42 credits in geology and 31 credits of supplementary courses. There have been no changes to the core curriculum for the Bachelor of Arts Degree in Geology since it was awarded provisional status by the Board of Regents.

Students in the B.S. program take several upper-division courses not required of students in the B.A. On the other hand, students working towards their Bachelor of Arts degree are able to take a larger number of courses in English, the Humanities, Social Sciences, and other Natural Sciences than in the Geology Bachelor of Science program. Such breadth is especially desirable in the education of teachers, technical positions, and other jobs in the local workforce that do not require going on to graduate school to obtain an advanced degree.

2. Is the Geology B.A. program meeting its learning objectives for students?

Feedback from currently enrolled Geology majors and recent graduates has indicated a high degree of satisfaction with the Geology B.A. degree program. Standard course evaluations and interviews with students have also indicated that both the B.A. degree students and the B.S degree students have a high degree of satisfaction with the upper division geology courses. There was a small concern at the outset that the B.A. degree students might not be as well prepared as the B.S. students and either struggle in the courses or slow the pace of the courses. This has proven not to be a problem. The high degree of employability of our graduates is another strong indication that learning objectives are being met.

TABLE 1. Quantitative Indicators for the Bachelor of Arts Degree in Geology at UH Hilo
(Data is presented for Fall Semesters only except for Whole Year SSH).

GEOLOGY DEPT -- UHH	2001-02	2002-03	2003-04	2004-05	2005-06
HEADCOUNT MAJORS	**23**	**26**	**31**	**30**	**32**
BA			**4**	**5**	**9**
BS			**27**	**25**	**23**
DEGREES AWARDED (Yearly)	**6**	**2**	**5**	**5**	**11**
BA –Total for Academic Year			**1**	**1**	**3**
BS –Total for Academic Year	**6**	**2**	**4**	**4**	**8**
COURSE FTE ENROLLMENT 1/	**45**	**42**	**47**	**44**	**42**
Lower Division	**42**	**33**	**41**	**38**	**35**
Upper Division	**3**	**9**	**6**	**6**	**7**
NUMBER OF CLASSES 1, 2/	**11**	**12**	**14**	**13**	**14**
Lower Division	**10**	**9**	**10**	**10**	**9**
Upper Division	**1**	**3**	**4**	**3**	**5**
AVERAGE CLASS SIZE 1, 2/	**23**	**20**	**19**	**19**	**16**
Lower Division	**24**	**21**	**23**	**21**	**20**
Upper Division	**13**	**19**	**9**	**11**	**8**
FALL SSH TAUGHT 1/	**674**	**621**	**710**	**660**	**634**
Lower Division	**632**	**492**	**616**	**564**	**523**
Taken by own Majors (Pct)				**7.1%**	**22.2%**
Taken by Non-Majors (Pct)				**92.9%**	**77.8%**
Upper Division	**42**	**129**	**94**	**96**	**111**
Taken by own Majors (Pct)				**71.9%**	**63.1%**
Taken by Non-Majors (Pct)				**28.1%**	**36.9%**
WHOLE YEAR SSH TAUGHT 1/	**1,449**	**1,264**	**1,468**	**1,295**	**1,263**
ESTIMATED FTE STUDENTS 3/	**97**	**84**	**98**	**86**	**84**
ESTIMATED FTE FACULTY 3, 4/	**4**	**4**	**4**	**3.7**	**3.5**
E. STUDENT FACULTY RATIO 3/	**24**	**21**	**24**	**23**	**24**

1/ Course level data, includes Geology BA and BS majors.
2/ Excludes classes numbered -99 (Individual Instruction).
3/ Numbers estimated from other numbers given from system data, no system data.
4/ The UHH Geology Department consists of 4 faculty, but the FTE may vary depending on course releases for research and service work.
5/ There was no system data available for these categories. Estimates of FTE were made from other data given. No financial data was available at the time of this study.

3. Are the Geology B.A. program resources adequate?

No additional resources have been required for implementation of the B.A. degree or are needed over the next 5 years beyond that required by the existing Geology program. Since the Bachelor of Arts degree program shares existing facilities and courses with the long established Bachelor of Science degree program there are adequate resources for both programs. Our total major count has increased upon inception of the B.A. program but the 4 fulltime faculty in the Geology Department are sufficient to handle the courses with no extra lecturers (see Table 1). The additional B.A. degree students actually increase the efficiency of upper division course offerings and are a positive influence on the overall program.

The curriculum includes only existing courses and students in the B.A. may take fewer 400-level geology courses than those working for their B.S. degree if they choose to substitute science courses from other disciplines. Required lower-division courses in math, physics and chemistry, are also required for other majors, but the relatively small numbers of geology majors will have a only modest impact on those courses. The exact budget numbers for the Geology B.A. are difficult to interpret (see the Cost and Revenue spreadsheet at the end of the document) as the costs of the Geology B.S. degree and the Geology B.A. degree are completely intermingled.

4. Is the Geology B.A. program efficient?

The Geology B.A. program has increased the overall number of Geology majors and graduates (see graphs) and thus increased the efficiency of our upper division course offerings. The overall estimated student to faculty ratio has remained constant since offering the B.A., but this is largely influenced by the number of general education course offerings, which have varied slightly due to research and service related course releases in the department. The overall efficiency and costs of the Geology program are similar to those of other Natural Science disciplines at UH Hilo as shown by the recent Self-Study and Assessment of the Geology Program. No major deficiencies were found though it was agreed that the department would operate more efficiently if the number of majors is increased to 40-50. The conversion of the B.A. program from provisional to established is an integral step towards increasing our major count and overall efficiency. The overall goal is to increase our major count to the point where we could offer some of the required courses on a yearly basis as opposed to the alternate year schedule that they are currently offered.

5. Evidence of Geology B.A. program quality?

The Geology B.A. program retains the consistent high quality of the existing Geology B.S. program. This is supported by the recent satisfactory assessment[1] of the Geology Program as a whole and the high quality of graduates that come from our program. We have produced a number of graduates that have gone on to graduate school at UH Manoa as well as Stanford, Notre Dame, University of Washington, and other schools. The high degree of employability of our recent Geology B.A. degree recipients is strong evidence that these students are also well prepared (see Table 2).

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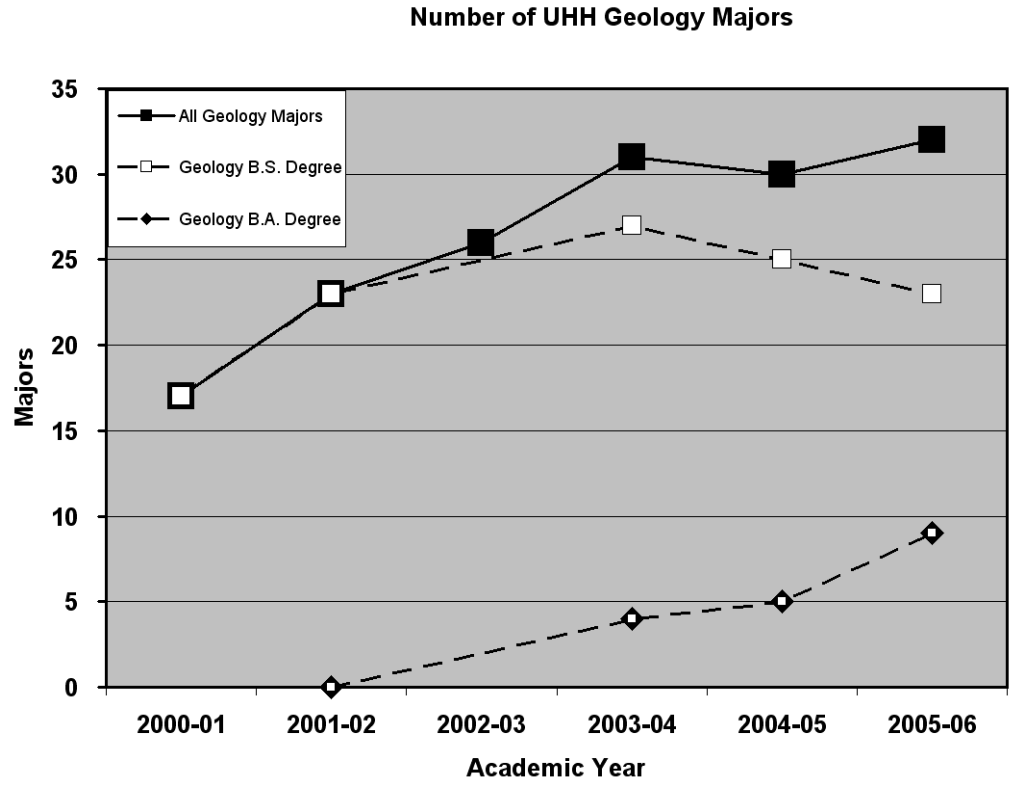
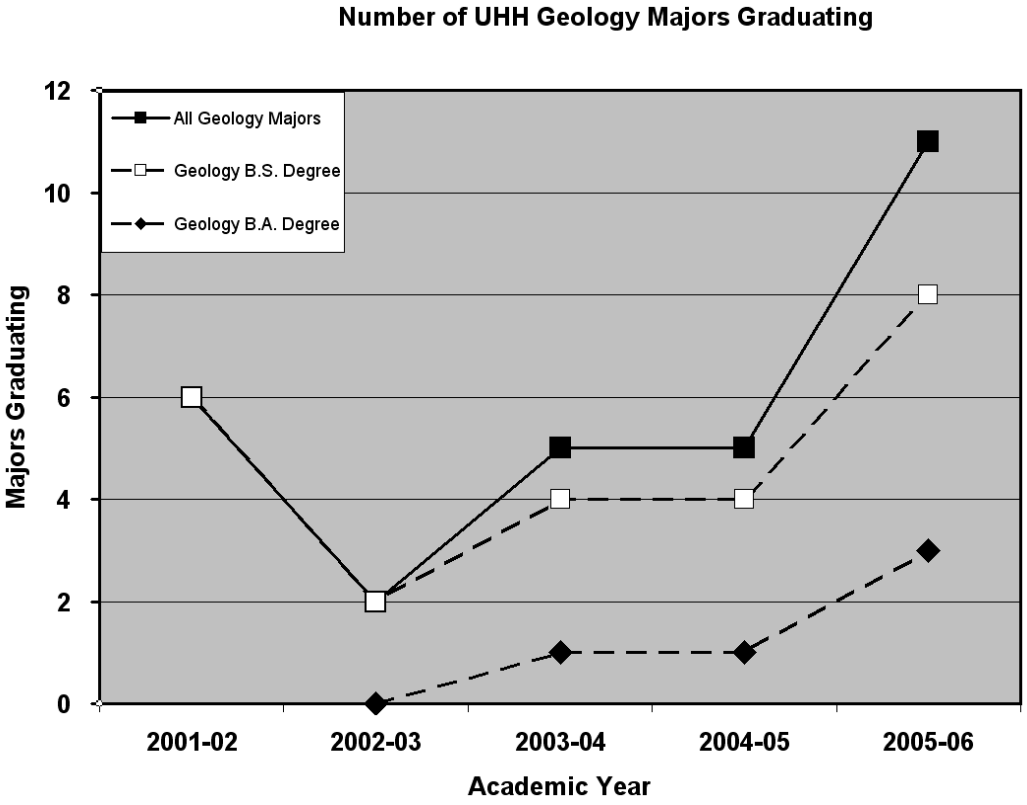
[1] "Geology Department Assessment Self Study Report, Fall 2002" available from the UH-Hilo VCAA office.





6. Are the Geology B.A. program outcomes compatible with objectives?

The program has a high success rate for graduates finding jobs with all of our B.A. graduates either finding technical jobs or in training to become a teacher (see Table 2). While the sample of graduates is small since the program is new, the 100% employment rate of the graduates suggests that the program objectives are producing students whose skills are desired. The fact that 75% of these students have found jobs here on the Big Island is also promising for attracting local students who wish to pursue professional careers here in Hawai‘i. This contrasts with only about 10-20% of our Geology B.S. graduates that are employed in Hawai‘i as most leave the state to pursue graduate studies.

Table 2. Employment Status of Graduates of the Geology B.A. Degree. Spring 2004 to Spring 2006

NAME		DEGREE	Working on Big Island?	JOB
Kamibayashi, Kevan **(Spring 2004)** **Former Na Pua No`eau program in middle school.**	**B.A.**	**GEOLOGY**	**Yes**	**Geodetic specialist doing volcano monitoring for the USGS Hawaiian Volcano Observatory. First UHH graduate to get a permanent job at the Hawaiian Volcano Observatory.**
Lambert, Marcus **(Spring 2005)** **Geography double major and Honors student.**	**B.A.**	**GEOLOGY**	**No**	GIS Analyst in the petroleum industry in Texas.
LaChance, Fred **(Fall 2005)**	**B.A.**	**GEOLOGY**	**Yes**	**Surveyor on Big Island**
Hernandez, Angel **(Spring 2006)** **Former Dive Boat Captain, Kona resident.**	**B.A.**	**GEOLOGY**	**In the near future**	**UHH Teacher Training Program. Goal is to become a secondary school science teacher in West Hawaii.**
Remington, Robin **(Spring 2006)**	**B.A.**	**GEOLOGY**	**Deceased**	**Would have been employed in Hawaii**

7. Are the Geology B.A. program objectives still appropriate functions of the college and university?

Part of the strategic mission of the University of Hawai‘i at Hilo is to use the Big Island as a living laboratory to attract and stimulate students. There are, in fact, a number of students from Hawai‘i, the Pacific Basin, and the mainland who are attracted to UH Hilo because of the proximity to active volcanoes. The Geology B.A. program is designed to attract more new students and more transfer students to UH Hilo in support the UH Hilo goal of increased enrollment, particularly for smaller departments. In addition, the less demanding ancillary science requirements and more flexible curriculum allow students to make changes in career goals, which has improved retention of students within the Geology program. Enrollments in the Geology Program at UH Hilo have reached all time highs due in part to the implementation of the Geology B.A. degree option. In 2000-01, we had 17 majors and this has increased to 32 as of 2005-06 with nine of these having declared a Geology B.A. major. Likewise numbers of graduating Geology majors have increased from an average of four to five per year to an all time high of 11 in the 2005-06 year with three of these being Geology B.A. recipients. As time progresses, we anticipate an increased percentage of degrees being awarded to Geology B.A. students.

The Geology B.A. degree is intended to make the study of geology more accessible to a wider variety of students with broader career goals, especially those that will be retained in the local workforce after graduation. This is consistent with the University’s mission of providing accessible education for residents of the Big Island. The U.S. Bureau of Labor statistics projections for 2004 to 2014 show a substantial increase in positions related to environmental engineering, hydrology, and physical sciences all of which the graduates are qualified to do. In the near future, Hawai‘i faces critical environmental problems related to development, water usage, waste disposal, and pollution that will require trained earth scientists to address. There is also a constant shortage of good science teachers on the Big Island that creates a demand for our graduates, especially to teach earth and space sciences at the eighth grade level.

Summary

The addition of the Bachelor of Arts in Geology degree to the existing Bachelor of Science degree has enhanced the overall efficiency of the Geology Program at UH Hilo by significantly increasing both the number of Geology majors and the number of Geology graduates in the short time since implementation as a provisional degree. Both the faculty and the students within the Geology Program are pleased with the new degree track and the flexibility it allows. The new degree had no initial implementation costs and there are none for the foreseeable future. The degree serves to lower the cost of SSH in upper division courses and increase the overall departmental efficiency. A very high percentage of graduates from this program have gone on to professional employment on the Big Island with their employers expressing a high degree of satisfaction. The conversion of the Bachelor of Arts in Geology degree from provisional status to an established degree program will be highly beneficial to the Geology program at the University of Hawai‘i at Hilo.

Academic Program Cost and RevenuesTemplate

ENTER VALUES IN HIGHLIGHTED CELLS ONLY

CAMPUS/Program UH Hilo / Geology

	Provisional Years			Projected Years				
	Year 1	Year 2	Year 3	Year 1	Year 2	Year 3	Year 4	Year 5
ENTER ACADEMIC YEAR (i.e., 2004-05)	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	20010-11
Students & SSH								
A. Headcount enrollment (Fall)	31 (4)	30 (5)	32 (9)	33 (9)	34 (10)	35 (10)	36 (10)	37 (11)
B. Annual SSH	1,468	1,295	1,263	1,307	1,353	1,400	1,449	1,500
Direct and Incremental Program Costs								
C. Instructional Cost	$ 189,496	$ 200,231	$ 191,067	$ 200,620	$ 218,676	$ 240,544	$ 303,085	$ 303,085
D. Other Personnel Costs								
E. Unique Program Costs	$ 17,156	$ 11,951	$ 12,441	$ 13,849	$ 13,849	$ 13,849	$ 13,849	$ 13,849
F. Total Direct and Incremental Costs	$ 206,652	$ 212,182	$ 203,508	$ 214,469	$ 232,525	$ 254,393	$ 316,934	$ 316,934
Revenue								
G. Tuition	$ 274,516	$ 244,962	$ 241,435	$ 298,963	$ 356,786	$ 409,416	$ 467,447	$ 608,700
Tuition rate per credit	$ 187	$ 189	$ 191	$ 229	$ 264	$ 292	$ 323	$ 406
H. Other								
I. Total Revenue	$ 274,703	$ 245,151	$ 241,626	$ 299,192	$ 357,050	$ 409,708	$ 467,770	$ 609,106
J. Net Cost (Net Incremental Cost of the Program to the Campus)	-68,051	-32,969	-38,118	-84,723	-124,525	-155,315	-150,836	-292,172
Comparable Cost per SSH								
Program Cost per SSH								
K. Total Direct Cost/SSH	$ 141	$ 164	$ 161	$ 164	$ 172	$ 182	$ 219	$ 211
L. Support Cost/SSH	$ 262	$ 262	$ 262	$ 262	$ 262	$ 262	$ 262	$ 262
Non-Instructional Exp/SSH	$ 227	$ 227	$ 227	$ 227	$ 227	$ 227	$ 227	$ 227
System-wide Support	$ 35	$ 35	$ 35	$ 35	$ 35	$ 35	$ 35	$ 35
Organized Research								
M. Total Program Cost/SSH	$ 403	$ 426	$ 423	$ 426	$ 434	$ 444	$ 481	$ 473
N. Total Campus Expenditure/SSH	$ 471	$ 471	$ 471	$ 471	$ 471	$ 471	$ 471	$ 471
Instruction Cost per SSH								
O. Program Instruction Cost/SSH	$ 129	$ 155	$ 151	$ 153	$ 162	$ 172	$ 209	$ 202
P. Comparable Cost/SSH	$ 201	$ 201	$ 201	$ 201	$ 201	$ 201	$ 201	$ 201
Program used for comparison:	Natural Sciences							

Instructions

A. Headcount enrollment: Headcount enrollment of majors each Fall semester. Located at url: http://www.iro.hawaii.edu/maps/mltitles.asp

B. Annual SSH: Course Registration Report located at http://www.iro.hawaii.edu/maps/mltitles.asp. Add the SSH for the Fall and Spring reports to obtain the annual SSH.

C. Instructional Cost: Direct salary cost for all faculty teaching in the program. Add negotiated collective bargaining increases and keep salary flat thereafter.

D. Other Personnel Cost: Salary cost (part or full time) for personnel supporting the program (APT, clerical lab support, advisor, etc.) This includes personnel providing necessary support for the program who may not be directly employed by the program and may include partial FTEs.

E. Unique Program cost: Costs specific to the program for equipment, supplies, insurance, etc. For provisional years, this would be actual cost. For established years, this would be projected costs using amortization for equipment.

F. Total Direct and Incremental Cost: C + D + E

G. Tuition : Annual SSH X tuition rate/credit

H. Other: Other sources of revenue including grants, program fees, etc. This should **not** include in-kind contributions unless the services or goods contributed are recorded in the financial records of the campus and included in Direct and Incremental Costs in this template.

I. Total Revenue: G + H

J. Net Cost: F - I

K. Total Direct Cost/SSH: F/B

L. Support Cost/SSH:The **campus'** non instructional expenditure/ssh + systemwide support – organized research (UHM only) as provided by UH Expenditure Report (http://drue.its.hawaii.edu/uhexpend/)

For example, from the 2003-04 UH Expenditure Report, the support expenditure/ssh per campus is:

UHM	$335.00 + $53 - $110 for organized research = $278
UHH	$227.00 + $35 = $262
UHWO	$132.00 + $26 = $158
Haw CC	$ 89.00 + $33 = $122
Hon CC	$136.00 + $40 = $176
Kap CC	$93.00 + $29 = $122
Kau CC	$269.00 + $63 = $332
Lee CC	$91.00 + $27 = $118
Maui CC	$137.00 + $36 = $173
Win CC	$195.00 + $40 = $235

M. Total Program Cost/SSH: K + L

N. Total Campus Expenditure/SSH: Taken from UH Expenditures Report For example, for 2003-2004: UHM = $710-110 (organized research) = $600, UHH = $471, UHWO = $352, HawCC = $293, HonCC = $353, KapCC = $259, KauCC = $554, LeeCC=$241, Maui CC= $318, WinCC=$349

O. Program Instruction Cost/SSH: C/B

P. Comparable Program/Division Instructional Cost/SSH: Taken from UH Expenditures Report or campus data, as available. Please note in the space provided, the program used for the comparison.