# University of Hawaii Community Colleges
# Instructional Annual Report of Program Data (ARPD)



Select the desired review year, college, and program from the drop down menus. Once a program has been selected, the results will be displayed.

| Review Year: | College: | Program: |
|---|---|---|
| 2016 | Kapiolani Community College | Natural Science |

## College: Kapiolani Community College
## Program: Natural Science

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The last comprehensive review for this program was on **2013**, and can be viewed at:
**http://ofie.kapiolani.hawaii.edu/wp-content/uploads/2013/01/cprnatsciences2013.pdf**

## Program Description

The goal of the Kapi'olani Community College STEM Program is to improve the overall quality of education in the fields of science, technology, engineering and mathematics (STEM). This is accomplished through various strategies: recruitment of potential new STEM majors through Summer Bridge Programs, and retention of existing ASNS students through the institutionalization of undergraduate research in RI designated courses and SCI 295 course, in addition to the offering of classes in traditional instructional setting but also using accelerated models. These efforts are designed to:

- increase the number of STEM students transferring into 4-year degree programs
- increase the number of STEM students graduating with the ASNS degree
- increase in the number of Native Hawaiians STEM students transferring into 4-year degree programs
- increase in the number of Native Hawaiians STEM students graduating with the ASNS degree

The program itself was born in August of 2005 with a $1.25 million Tribal Colleges and Universities Program (TCUP) grant from the National Science Foundation (NSF) for the development and implementation of the STEM program. The college has since leveraged this initial funding and has received nearly $16 million in external funding in support of its STEM efforts.

The primary missions of the Associate in Science in Natural Science (ASNS) degree at Kapi'olani Community College (KapCC) are to

1. transfer students into baccalaureate degrees in Science, Technology, Engineering, and Mathematics (STEM) at the University of Hawai'i at Manoa (UHM), the University of Hawai'i at Hilo (UHH) and other universities in Hawai'i and on the US Mainland
2. graduate students with the ASNS degree and certificates.

The entire ASNS curriculum consists of courses articulated across the University of Hawai'i system that meet requirements or serve as electives for STEM majors at UHM and UHH. This program is also well suited for nontraditional students who need to attain proficiency in fundamental math and science courses in order to retrain for a STEM career. Much of the core ASNS curriculum is offered online to allow access for working professionals and others whose commitments may make it difficult to attend on-campus classes. The degree provides potential STEM employers with assurance that ASNS graduates have successfully completed courses in calculus mathematics, computer science, and fundamental sciences, have a firm grasp of the scientific method, and know how to make presentations, how to write scientific reports and how to work as a team member.

## Part I. Quantitative Indicators

# Overall Program Health: Healthy

**Majors Included: NSCI  Program CIP: 30.1801**

| Demand Indicators | | Program Year | | | Demand Health Call |
|---|---|---|---|---|---|
| | | 13-14 | 14-15 | 15-16 | |
| 1 | Number of Majors | 356 | 391 | 442 | Healthy |
| 1a | Number of Majors Native Hawaiian | 77 | 77 | 78 | |
| 1b | Fall Full-Time | 50% | 50% | 47% | |
| 1c | Fall Part-Time | 50% | 50% | 53% | |
| 1d | Fall Part-Time who are Full-Time in System | 6% | 5% | 7% | |
| 1e | Spring Full-Time | 48% | 46% | 49% | |
| 1f | Spring Part-Time | 52% | 54% | 51% | |
| 1g | Spring Part-Time who are Full-Time in System | 6% | 7% | 8% | |
| 2 | *Percent Change Majors from Prior Year | 19.8% | 9.6% | 13.1% | |
| 3 | SSH Program Majors in Program Classes | 2,130 | 2,072 | 2,306 | |
| 4 | SSH Non-Majors in Program Classes | 3,203 | 2,928 | 2,618 | |
| 5 | SSH in All Program Classes | 5,333 | 5,000 | 4,924 | |
| 6 | FTE Enrollment in Program Classes | 178 | 167 | 164 | |
| 7 | Total Number of Classes Taught | 89 | 95 | 100 | |

| Efficiency Indicators | | Program Year | | | Efficiency Health Call |
|---|---|---|---|---|---|
| | | 13-14 | 14-15 | 15-16 | |
| 8 | Average Class Size | 20.3 | 17.8 | 16.5 | Cautionary |
| 9 | *Fill Rate | 77.8% | 72.1% | 69.6% | |
| 10 | FTE BOR Appointed Faculty | 2 | 2 | 6.2 | |
| 11 | *Majors to FTE BOR Appointed Faculty | 178 | 195.2 | 71.1 | |
| 12 | Majors to Analytic FTE Faculty | 40.9 | 45.5 | 33.8 | |
| 12a | Analytic FTE Faculty | 8.7 | 8.6 | 13.1 | |
| 13 | Overall Program Budget Allocation | $887,977 | $883,808 | $614,634 | |
| 13a | General Funded Budget Allocation | $554,363 | $703,442 | $429,358 | |
| 13b | Special/Federal Budget Allocation | $0 | $0 | $0 | |
| 13c | Tuition and Fees | $333,614 | $180,366 | $185,276 | |
| 14 | Cost per SSH | $167 | $177 | $125 | |
| 15 | Number of Low-Enrolled (<10) Classes | 7 | 21 | 27 | |

***Data element used in health call calculation**  **Last Updated: July 19, 2017**

| Effectiveness Indicators | | Program Year | | | Effectiveness Health Call |
|---|---|---|---|---|---|
| | | 13-14 | 14-15 | 15-16 | |
| 16 | Successful Completion (Equivalent C or Higher) | 74% | 72% | 68% | |
| 17 | Withdrawals (Grade = W) | 140 | 140 | 157 | |

| | | | | | |
|---|---|---|---|---|---|
| 18 | *Persistence (Fall to Spring) | 72.7% | 67.4% | 67.6% | |
| 18a | Persistence Fall to Fall | 46.7% | 40% | 40.7% | |
| 19 | Unduplicated Degrees/Certificates Awarded Prior Fiscal Year | 30 | 58 | 90 | |
| 19a | Associate Degrees Awarded | 31 | 58 | 91 | |
| 19b | Academic Subject Certificates Awarded | 0 | 0 | 0 | **Healthy** |
| 19c | Goal | 12 | 12 | 0 | |
| 19d | Difference Between Unduplicated Awarded and Goal | 100% | 383.3% | 0% | |
| 20 | Transfers to UH 4-yr | 42 | 46 | 78 | |
| 20a | Transfers with degree from program | 6 | 8 | 20 | |
| 20b | Transfers without degree from program | 36 | 38 | 58 | |
| 20c | Increase by 3% Annual Transfers to UH 4-yr Goal | 3 | 4 | 0 | |
| 20d | Difference Between Transfers and Goal | 1300% | 1050% | 0% | |

| Distance Education: Completely On-line Classes | | Program Year | | |
|---|---|---|---|---|
| | | 13-14 | 14-15 | 15-16 |
| 21 | Number of Distance Education Classes Taught | 3 | 3 | 7 |
| 22 | Enrollments Distance Education Classes | 106 | 88 | 134 |
| 23 | Fill Rate | 100% | 87% | 58% |
| 24 | Successful Completion (Equivalent C or Higher) | 65% | 74% | 57% |
| 25 | Withdrawals (Grade = W) | 11 | 10 | 20 |
| 26 | Persistence (Fall to Spring Not Limited to Distance Education) | 76% | 81% | 67% |

| Performance Measures | | Program Year | | |
|---|---|---|---|---|
| | | 13-14 | 14-15 | 15-16 |
| 27 | Number of Degrees and Certificates | 31 | 58 | 91 |
| 28 | Number of Degrees and Certificates Native Hawaiian | 6 | 14 | 16 |
| 29 | Number of Degrees and Certificates STEM | 31 | 58 | 91 |
| 30 | Number of Pell Recipients | 129 | 165 | 161 |
| 31 | Number of Transfers to UH 4-yr | 42 | 46 | 78 |

***Data element used in health call calculation** **Last Updated: July 19, 2017**

Glossary | Health Call Scoring Rubric

## Part II. Analysis of the Program

**Demand:**

Line item 2 is the data element used in health call calculation. According to the Annual Report of General and Pre-Professional Education Program Data Glossary 2016 (last updated on 1/11/17), the percentage provided on this line item is computed as follow:

"In alignment with UHCC Strategic Planning Goals, General and Pre-Professional Education programs are expected to grow by 3% per year.
Data source: Calculated. Difference between number of majors (#1) of current program year and previous program year divided by #1 of current program year". According to this definition, the percentage should be:
ABS(442-391)/442 = 11.5%
The number listed in incorrect (0%). It is obvious that a mistake is present since the number of majors has increased from 391 to 442, which represents a growth of 11.5%, almost four times the projected one of 3% even though the overall College

students' enrollment has decreased last year! Hence we suggest a new rating called "Super Healthy", which is the one that would fit best for this category.

**Efficiency:**

The efficiency health call remains in the "Cautionary" status due to the high ratio of the number majors (442) divided by the sum appointments (6.2). Clearly, this shows that 71.1 majors to 1 faculty is the current situation. The possible causes of this large ratio is due to the following:

- First, from the above table, 0.2 faculty is an oddity… it is well known that STEM faculty may tend to be bizarre sometimes, but 0.2 of them is more troublesome…
- Second, except for the 6 FTE hired and listed on the above table, ALL Math&Sciences faculty members hired prior to the creation of the ASNS degree were hired as liberal arts faculty, so the student to faculty ratio ought to be high. If only considering faculty members newly hired.
- Third, most faculty members in the ASNS program are teaching courses counting for the AA program and are counted as such. For instance, physics faculty teach phys100, and phys170 (AA) as well as the phys272 and phys274 (ASNS). It would be unreasonable to ask them to refuse teaching introductory courses required by AA students and only focus on high level ASNS courses in their disciplines only for the purpose of satisfying this indicator. Educational best practice suggests that faculty should rotate their offered courses so that students have a wide and fresh variety of teaching styles available to them. It would be a disservice to the students to allow certain faculty to only teach higher level courses (ASNS). It is our duty to serve all students and their wide learning styles that can be addressed by our faculty's varied teaching pedagogy. As long as we do so by rotating faculty assigned to courses, most of our M/S faculty members are used in the Liberal Art annual report of program data calculations and are included not in the ASNS one, which naturally causes this indicator to remain cautionary.

**Effectiveness:**

The effectiveness health call remains "Healthy" due to strong persistence (67.6% Fall to Spring) and also due to the astonishing results of the ASNS program with respect to three additional indicators:

1. The number of graduates has increased from 58 to 91
2. The number of transfer (all) to UH 4-yr has almost doubled from 46 to 78
3. The number of transfer (with degree) to UH 4-yr has almost tripled from 8 to 20

It is important to note that errors are present in these data. Line item 19c (Goal) and 20c is at 0 while according to the same document cited above (under Demand), it should reflect an increase by 3%. This causes line items 19d, and 20d to be incorrect.
Both graduate and transfer numbers far exceeded the 3% goal set by the UH system. The number of students who withdrew from ASNS major courses is expected to increase since the number of majors also increased.

In addition, based on the significant increase of online course offerings, it is worth to note that the ASNS program (although ignored in the Health calls) has made tremendous efforts in supporting non-traditional students who may not be able to physically attend traditional courses. This in turn allows the College to save a significant amount of funds in energy and classroom space. Indeed, the number of distance education classes has increased by 34% since last year. Based on such a significant increase, this effectiveness health call should also be called "Super Healthy".

Finally, the performance measures #27, #29, and #31 are worth noting. Such increases were not only due to faculty's additional efforts, but also due to the extraordinary support from our STEM counselor who worked with the STEM Director, and numerous faculty members and contacted many students individually, reminding them to graduate. The faculty members who have worked very hard to make this happen, request that the funds given back to the college by the system when these performance measures are reached, are re-allocated back to the department to continue support our students.

# Part III. Action Plan

Undergraduate research experience (URE) is a hallmark for the ASNS degree program, with the ASNS students winning awards at national competitions and conferences. It has been a source of pride for the students, the ASNS degree program, and the College. In the academic year of Fall 2015 and Spring 2016, 17 students attended three National conferences: the National Conference on Undergraduate Research (NCUR), the Emerging Researchers National Conference (ERN), and the Society for Advancement of Chicanos and Native Americans in Science (SACNAS). At SACNAS, one of our ASNS students represented the program and College by winning the best presentation in the Biological, Agricultural & Environmental Life Sciences category.

In order for URE to continue at the high level at which it is currently operating, the students need mentorship, space, and supplies. The mentorship has come through dedicated STEM faculty who work with the students, and this has been supported through the creation of the SCI 295 undergraduate research courses and the "research intensive" (RI) course designation. This institutionalization effort was supported by the previous VCAA and faculty compensation has been received very positively. For this, we thank the administration for recognizing faculty's exceptional efforts in student engagement. However, supplies and space are more than ever needed due to the increase of students demand for URE. The number of RI designated courses and SCI 295 courses offered this past academic year has increased significantly from the previous year: a new RI designated course in Botany is now available, and SCI 295 are now offered in the fields of Botany and Mathematics. In addition, the number of students enrolled in such courses (RI and 295) has increased from 135 to 149, which represents a 9% increase.

**Support: Institutionalization of an Undergraduate Research APT Position**. There is growing momentum at the college for involving students in undergraduate research experiences. Coaching students through the URE process still places a high demand on faculty mentors' time from a logistics point of view. A STEM URE support position would provide much-needed logistic support. Indeed, the ASNS program has institutionalized a bi-annual (every semester) Research Symposium (Students Undergraduate Research Fair or SURF) for students to share their work with each other and the rest of the College. Supporting additional SCI 295 becomes an additional burden for existing APT members. The implementation of SURF used to be handled by grant funded individuals who are not gone due to the end of grant cycle. Hence, faculty members have been volunteering to organize, and print all the posters during their free time. Last year, 8 faculty members engaged their students in URE, 54 posters were presented by 93 students over a two-day period. SURF, offered each semester, is clearly a success and celebrates our students' achievement. However, the ASNS faculty members are now hitting a critical mass with respect to logistics. This position would also serve as a campus-wide resource and would benefit the entire campus as well if a campus-wide URE is institutionalized.

**Support: request for Lab Technician Positions.** In addition to the increase of support needed for URE activities, at least one additional Lab Technician is still very much needed to support our current ASNS laboratory courses. If a 3% increase is required, more courses and laboratory courses need to be offered. However, the current status to prepare these laboratory courses is as follow:

Taking the example of Spring 2016, 85 laboratory courses were offered (including some SCI 295). 69 of them are prepared by Lab Technicians. The M/S department has two Lab Technicians. Hence, each Lab Technician at KAPCC needs to prepare about 34 laboratories each week. The additional 16 laboratory courses cannot be prepared by APT: there is just not enough hours in a week to support these; hence, engineering, physics and physiology faculty members are preparing their own laboratory classes (including all their SCI 295). If we do include these currently unprepared/unsupported laboratories (as we should), each Lab Technician in the department would need to be responsible and prepare 42.5 Laboratory classes per week. There is clearly a problem here, especially when we consider the work load of Lab Technicians at other CCs whose load is on average 12 Laboratory classes per Lab Technician (LT): about ~3 times less! (HCC: 12 labs, 1 LT / WCC: 12 labs, 1 LT / LCC: 21 labs, 2 LT). We are therefore in dramatic need of at least one additional Lab Technician member in order to be more equitable with other Community Colleges in the UH system.

1. Space for URE and existing ASNS courses. Students need space to conduct inquiry-based undergraduate research. Currently, URE students are conducting research in various scattered locations on and off campus, many of which are temporary solutions. We would continue to request space for the long term. If the system requires us to increase our program enrollment by 3% every year, additional space must be provided. It would be unreasonable to expect such an increase with no additional space for ASNS required laboratory classes and new SCI 295 courses. We are requesting to continue using Leahi/Sinclair space, petitioning that a MOA be finalized to ensure long term use of

such space that needs to be secure, contracted, and available 24/7. We would like to also propose using some of the possibly vacant space available when the culinary department is moving to their new building. Meanwhile, we will go above and beyond and attempt to establish collaborations with feeder high schools, engage their students in URE and hopefully be allowed to use their space for URE.

2. Supplies for ASNS courses. We would like to request that the Math and Sciences budget be not only restored but also increased so that 1) the existing ASNS courses can have the supplies needed to provide rigorous science and engineering instruction with engaging course activities 2) the additional research courses can be supported and not rely on grant funds which are now sparse. Physics lab equipment has not been updated since 2008, in Anatomy and Physiology, one specimen and one piece of lab equipment is currently dissected by a team of 5 students. Ideally laboratory teams should be made up of two students. The laboratory learning experience of ASNS students is severely affected by our current lack of funding. These are just examples of why the supply budget of the M/S department should be increased.
3. New Faculty Position. In order to attempt to close the gap reflected in the Demand health call, we would like to first acknowledge the support of the administration for providing the Math and Science department with new positions, including one in ICS, which will support the new ASNS concentration in ICT. However, the ratio between full-time faculty and lecturer is still 1:2 for Anatomy and Physiology and 1:3 in engineering. Therefore, we would like to request three new positions: one in Anatomy and Physiology and two additional ones in Engineering. The number of engineering ASNS students was 281 in Summer 2016! This represents a student:faculty ratio of 93:1 and only one of the three engineering faculty is a full-time employee!
4. Continually Improve Outcomes Assessment Process. We will continue to refine our assessment of the program learning outcomes as described in the P-SLO section so that the program undergoes continual improvement.

## Part IV. Resource Implications

To echo our Action plan the implication on resources are:

1. Request for an Undergraduate Research Position (APT) and two Lab Technicians
2. Request for additional space to support the expected growth of our program and sustain course offering in addition to new research course sections
3. Request an increase of the Math and Sciences budget to sustain Laboratory offering and update/repair our Laboratory equipment and supplies
4. Request three new faculty full-time employees: 1 in Anatomy and Physiology and 2 in Engineering.

## Program Student Learning Outcomes

For the 2015-2016 program year, some or all of the following P-SLOs were reviewed by the program:

| Assessed this year? | | Program Student Learning Outcomes |
|---|---|---|
| 1 | No | Apply scientific knowledge, skills, and methods to problem solving, with a special emphasis on Hawai'i, where appropriate. |
| 2 | No | Utilize analytical reasoning or mathematical techniques to describe physical or biological phenomena. |
| 3 | No | Conduct inquiry-based investigations using computer algorithms, engineering design reviews, and/or the scientific process. |

| | | |
|---|---|---|
| **4** | **Yes** | Critically review discipline-specific literature and effectively communicate unbiased research orally and in writing. |

## A) Expected Level Achievement

**The VALUE rubric used in this assessment has a four-point scale. Ninety percent of the student posters were expected to score 2 or higher on the VALUE rubric (average score for the six elements assessed). According to the Academy of American Colleges and Universities (AAC&U), the VALUE rubrics allow for student learning at all undergraduate levels to be placed within a basic framework for expectations. Since "all undergraduate levels" includes students who are close to achieving their 4-year degree, expecting most of the 2-year ASNS degree program students to achieve at the 2 point mark is appropriate.**

## B) Courses Assessed

**The disciplines assessed (and represented at SURF) were:**

- Biological Sciences
- Engineering
- Physical Sciences

These are aligned with our ASNS concentration. We have no included the last track of our ASNS degree (ICT) since no research on that topic was present at that time.

Within each discipline, the following courses were assessed (14 courses)

BIO 265L, MICR 230, ME 213, EE 296, PHYS 170L, PHYS 272L, and SCI 295EC (Ecology), SCI 295ES (Environmental Sciences), SCI 295BL (Biology), SCI 295BT (Botany), SCI 295MI (Microbiology), SCI 295EN (Engineering), SCI 295CH (Chemistry), and SCI 295MA (Mathematics).

## C) Assessment Strategy/Instrument

**Based on the Next Steps reported last year:**

“We will evaluate student research posters again using the VALUE rubric. We will:

1. Conduct our follow-up session with the evaluators to discuss further modifications of the rubric. One suggestion is to change the rubric headings. Another suggestion is to combine the communication VALUE rubric along with the inquiry and analysis rubric so that poster sessions can be used to evaluate two program outcomes at the same time. The STEM faculty will continue this discussion and make these decisions.
2. Provide a norming session to evaluators to ensure inter-rater reliability and validity. The program coordinator was recently trained on how to conduct such a norming session and can facilitate the session.”

We have continued to assess the last P-SLO through the SURF event and students achievement.

The changes mentioned above have been implemented and a new assessment strategy has been implemented during the SURF event last year. To evaluate the last P-SLO “Critically review discipline-specific literature and effectively communicate unbiased research orally and in writing” an updated rubric was used based on the Association of American Colleges and Universities VALUE rubric.

The rubric was focused on six fundamental aspects:

1. Written Conventions (Genre and Disciplinary Conventions)
2. Critical Evaluation of Information and Sources (Evaluate Information and its Sources Critically)
3. Organization
4. Delivery
5. Supporting Material
6. Central Message

For each category the following scale was used: 1 (Benchmark), 2 and 3 (Milestones), and 4 (Capstone).

(the details of each numerical description for each aspect is different, long and will not be included here to avoid boring the reader but can be provided upon request).

## D) Results of Program Assessment

The results of the assessment of the last P-SLO through 30 randomly selected research projects are shown in the following table:

| | Biological Sciences (n=17) | Engineering (n=5) | Physical Sciences (n=7) | Math (n=1) | Averages (n=30) |
|---|---|---|---|---|---|
| Written Conventions | 3.2 | 3.6 | 3.3 | 4 | **3.32** |
| Critical Evaluation of Information and Sources | 2.8 | 2.7 | 2.3 | 2.95 | **2.71** |
| Organization | 3.4 | 3.3 | 2.9 | 4.0 | **3.29** |
| Delivery | 3.4 | 3.8 | 3.6 | 4.0 | **3.53** |
| Supporting Material | 3.1 | 2.6 | 2.8 | 4.0 | **2.98** |
| Central Message | 3.2 | 3.6 | 3.4 | 4.0 | **3.34** |
| **Average** | **3.18** | **3.27** | **3.05** | **4.00** | **3.19** |

All the results are way above the set 2.0 limit. All averages were calculated using the weighted average formula to take in account the different n numbers. The lowest score, which is still above the 2.0 limit, is the fundamental aspect concerning "Critical Evaluation of Information and Sources" and needs to be addressed. But let's be honest, even PhDs don't even do this correctly most of the time....:)

## E) Other Comments

None.

## F) Next Steps

The next step is to restart the entire cycle of evaluation of our four program SLOs. We will be using the new assessment tool Taskstream when evaluating the first two as previously done through curriculum central.