

**Instructional Comprehensive Program Review: Natural Sciences
2016-2019**

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College Mission Statement:

Kapi'olani Community College provides open access to higher education opportunities in pursuit of academic, career, and lifelong learning goals to the diverse communities of Hawai'i. Committed to student success through engagement, learning, and achievement, we offer high quality certificates and associate degrees, and transfer pathways that prepare indigenous, local, national, and international students for their productive futures.

Part I: Executive Summary of CPR and Response to Previous Program Review Recommendations***Accomplishments in the last three years:***

The ASNS program has been instrumental in allowing the college to achieve one of the performance measures (STEM Degrees & Certificates) in the past three consecutive years. It has developed and implemented new SCI 295 courses, has continued to increase the number of Native Hawaiian and Underrepresented students in STEM degrees, has almost doubled the number of graduating students in years 2015-18 (90) compared to 2012-15 (46), and more than doubled the number of transferring students in years 2015-18 (93) compared to 2012-15 (41). The ASNS program has also more than doubled the number of students engaged into Undergraduate Research Experience (URE) as reflected in SURF participation (133 in 2016, 304 in 2018) while at the same time increased participation of students in other Arts disciplines. In addition, the ASNS program has increased the number of students benefitting from its mentor support system, and has excellent evaluations of its mentors. Finally, the ASNS and STEM program obtained five grants in the past 3 years for a total of \$3,513,040 to support STEM student success, while also bringing a total amount of \$369,300 of indirect cost to the college.

Goals for the next five years:

The ASNS program aims at achieving the following goals:

- Implement a systematic ASNS student tracking to establish early intervention to improve student retention, graduation and transfer, which in turn will continue to allow the college to benefit from performance measure funds [1];
- Continue to offer the adequate amount of courses in Mathematics, Chemistry, Physics (and Geophysics), Physiology, and Computer Sciences in order to provide students with the adequate opportunities to reduce their time for graduation in all four concentrations of the ASNS degree [2];
- Continue to provide ASNS students with excellence in mentoring through the STEM Center, and continue tutees tracking and mentor evaluation;
- Continue to be the undergraduate research campus leader in the UH Community College system, and offer the SURF symposium every semester by engaging not only ASNS students but also students majoring in Arts [3];

- Continue to offer top-quality laboratory courses without risking safety issues due to our current understaffed Math and Science department [4] ;
- Continue to offer outstanding quality education through ASNS courses [5].
- Continue to submit grant proposals to support new initiatives, and provide the college with additional indirect cost [6].

[1] given ASNS counselor support

[2] given an increase of BOR appointed faculty member

[3] given that an APT URE position is provided and additional space and funds for SCI 295 courses is provided

[4] given that our current APT position is converted to a permanent position and that an additional position is provided

[5] given that technology support is provided with laptops, laboratory equipment, teaching equipment, and a roof above our head that doesn't leak.

[6] given that faculty and/or APT members willing to write grant proposal are compensated by a 5% rate of the amount of the grant submitted.

Response to Previous Program Review Recommendations

No recommendations or feedback from the administrations have ever been received on previous ARPD report in the last three years.

Part II: Program Description

History

The Arts & Sciences program was established in 1965 when Kapi'olani Technical School was converted into Kapi'olani Community College.

The Arts & Sciences (A&S) academic cluster is composed of four units: Arts & Humanities; Languages, Linguistics and Literature (originally referred to as "Language Arts"); Math and Sciences; and Social Sciences. With a staff and faculty numbering well over 200 and responsibility for over 70% of the College's overall SSH enrollment, the A&S cluster is the single largest organizational unit at Kapi'olani Community College. A&S offers courses in support of General Education, transfer to a four-year university, as well as select career programs intended to lead to immediate employment.

At Kapi'olani Community College, Natural Sciences students can graduate with the AS Natural Sciences degree, an Associate in Arts (AA) degree, complete subject certificates, transfer into a college or university, and continue as lifelong learners. The Ka'ie'ie dual enrollment program provides a new pathway to a four-year degree by providing pre-admission to a select group of Kapi'olani CC students.

Efforts to clarify student pathways led to the introduction of the AS Natural Sciences degree, which was proposed and established in 2007. Since then, all other UHCCs have submitted proposals for an ASNS degree using KCC as a model and adopted the ASNS degree.

Program Description and Goals

The goal of the Kapi'olani Community College Associate in Science in Natural Science (ASNS) 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 STEM students graduating with the ASNS degree
- Native Hawaiians STEM students transferring into 4-year degree programs Native Hawaiians STEM students graduating with the ASNS degree

The primary missions of the ASNS degree at Kapi'olani Community College (KapCC) are to:

- Transfer students into baccalaureate degrees in Science, Technology, Engineering, and Mathematics (STEM) at the University of Hawai'i at Mānoa (UHM), the University of Hawai'i at Hilo (UHH) and other universities in Hawai'i and on the US Mainland
- 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. 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.

Program Student Learning Outcomes (P-SLOs)

The Program Student Learning Outcomes were updated by Math and Sciences faculty members, in order to be aligned with the updates of many ASNS courses' Student learning Outcomes and the overall program goals. The new outcomes became effective in Fall 2014.

Upon successful completion of the Associate in Science degree in Natural Science, the student should be able to:

- Apply scientific knowledge, skills, and methods to problem solving, with a special emphasis on Hawai'i, where appropriate.
- Utilize analytical reasoning or mathematical techniques to describe physical or biological phenomena.
- Conduct inquiry-based investigations using computer algorithms, engineering design reviews, and/or the scientific process.
- Critically review discipline-specific literature and effectively communicate unbiased research orally and in writing.

The ASNS program provides students with a two-year transfer degree composed of four concentrations in the STEM area:

- Biological Science (BSC)
- Physical (PSC)
- Engineering (ENGR)
- Information and Communications Technology (ICT)

In addition, two Certificate of Achievement (CA) and one Certificate of Competence degrees are provided within the ASNS degree:

- CA and CP in Biotechnology
- CA in STEM Education

Faculty and Staff¹

Overlap with Liberal Arts, as reported in Liberal Arts ARPDs:

FTE Liberal Arts BOR Appointed Faculty:

2015-2016: 81.5

2016-2017: 84.4

2017-2018: Data unavailable from the ARPD website as of March 31, 2019.

Liberal Arts Majors:

2015-2016: 3,125

2016-2017: 2,844

2017-2018: Data unavailable from the ARPD website as of March 31, 2019.

Liberal Arts Majors to FTE BOR Appointed Faculty:

2015-2016: 38.3

2016-2017: 33.7

2017-2018: Data unavailable from the ARPD website as of March 31, 2019.

ASNS Degree Specific Faculty, as reported in ASNS ARPDs:

ASNS FTE BOR Appointed Faculty:

2015-2016: **6.2**

2016-2017: **6**

2017-2018: Data unavailable from the ARPD website as of March 31, 2019.

ASNS Majors:

2015-2016: 442

2016-2017: 431

2017-2018: Data unavailable from the ARPD website as of March 31, 2019.

ASNS Majors to FTE BOR Appointed Faculty:

2015-2016: 71.1

2016-2017: 71.8

2017-2018: Data unavailable from the ARPD website as of March 31, 2019.

The fact that the ASNS degree program only has 6 BOR appointed faculty for 455 student majors results in a “Cautionary” student to faculty ratio (~71). Most courses in this degree program are taught by Liberal Arts faculty. The above analytic data strongly suggests that having more ASNS dedicated faculty would greatly benefit the program.

¹ Only Faculty data is reported as Staff information is unknown.

Resources

The bulk of the funds allocated to the ASNS program are budget allocations from the general (state) funds as awarded by the Hawai'i State Legislature. There is also significant budgetary and in-kind support from the National Science Foundation, the National Institute of Health, NASA and various small other external sources.

Several prestigious National Science Foundation (NSF) grants have been awarded to the College to support the STEM Initiative.

- PEECI (2015-2016): support Native Hawaiian students in the Engineering track.
- PEECII (2016-2019): support continuous support to Native Hawaiian students in the Engineering track.
- S-STEMI (2010-2016): provides ASNS scholarships based on academic success and financial needs.
- S-STEMII (2016-2021): provides continuous ASNS scholarships based on academic success and financial needs.
- LSAMP (2016-2019): support all minority students in the four ASNS tracks.
- TCUP SUP (2015-2017): support all ASNS minority students through an accelerated mathematics program (MIEM).

Additional sources of funding have been awarded as well:

- NIH (2015-2018): provides URE support to ASNS students in the Biological Science track, (specifically and exclusively in Biotechnology).
- NASA Space grant (2015-2019): provides URE support in Aerospace research topics to all ASNS students.

A grant from Kamehameha schools has also been awarded for the third consecutive year to support students' learning and projects in the biological sciences but has been taken away from the STEM Program in 2016 by the grant coordinator transferring to a different program at the College.

Finally, support has been obtained in 2016 from the college administration to support the STEM Center operations. Such operation includes student monitors as well as student mentors: a service that has become essential to ASNS student success.

Two additional grants have been submitted to the NSF to continue the support of the ASNS program: 1) PEEC2 supplemental grant (\$100K) to extend the current project by an additional year and 2) a SGR grant (\$200K) aimed at supporting a Mathematics initiative: Mathematics Immersion and Physics Integration (MIPI).

Articulation Agreements

Recognizing the primacy of in-system transfer, Kapi'olani has signed articulation agreements with three University of Hawai'i campuses: UH Mānoa, UH Hilo, and UH West O'ahu. The college has also secured articulation agreements with Chaminade University of Honolulu, Pacific University, Oregon State University, and Lamar University.

In addition, an articulation and transfer agreement has also been secured with the College of Engineering at UHM for the Kapi'olani ASNS Engineering pathway. This agreement has been so successful for the ASNS students in the Engineering pathway at Kapi'olani that it has been updated and deployed to all other Community Colleges offering an Engineering concentration for their ASNS degree.

Part III: Curriculum Revision and Review

Studies show that undergraduate research experience (URE) is one of the best practices in education for student success, retention, persistence and graduation. Historically, URE was funded exclusively through grant funding, but the need for institutionalizing this important initiative became apparent. Two curricular changes addressed the institutionalization of URE. In 2013, a new course SCI 295 (alpha) was proposed and approved. This course is an undergraduate research course with the "alpha" indicating the discipline on which research was conducted (example: SCI 295CH, STEM Research in Chemistry). SCI 295 was first offered in Spring 2014 with 5 options. In addition, undergraduate research is now also embedded in certain existing courses, which have an "RI" (research intensive) designation in Banner. These changes allow for student URE efforts to be formally recognized as part of their curriculum experience. In addition, SCI 295 was approved as an elective in the ASNS degree.

The SCI 295 revisions and updates led to the creation of new sections:

2015-2016: SCI BT (botany), MA (mathematics), and ES (environmental sciences)

2016-2017: SCI CS (computer sciences), and SCI PS (Physics)

The RI designation course revisions and updates also led to the creation of one addition course: BOT 101L.

A second curricular change was the entire revision of the ASNS program led by the University of Hawai'i system. Kapi'olani was the original campus leading the creation of the ASNS program in 2007. This program has been so successful that other community Colleges adopted this degree. In order to ensure compatibility between ASNS tracks across community colleges, it has been decided that all UH partners offer the same concentrations (tracks). In 2018, four concentrations remained:

- Biological Science (BSC)
- Physical (PSC)
- Engineering (ENGR)
- Information and Communication Technology (ICT)

The current list of ASNS courses and the amount of reviewed courses can be found in Table 1:

Table 1: List of updated ASNS courses

Course	Updated	Course	Updated	Course	Updated
BIOL 171	2016	CHEM 272	2016	MATH 243	2016
BIOL 171L	2016	CHEM 272L	2016	MATH 244	2016
BIOL 172	2016	CHEM 273	2016	ME 213	2016
BIOL 172L	2016	CHEM 273L	2016	PHYS 170	2016
BIOL 265	2016	EE 160	2016	PHYS 170L	2016
BIOL 265L	2016	EE 211	2016	PHYS 272	2016
BIOL 275	2017	EE 296	2016	PHYS 272L	2016
CE 270	2016	MATH 241	2016	PHYS 274	2016
CE 271	2016	MATH 242	2016	SCI 295	2016

From 2015 to 2018, 100% of the ASNS courses have been reviewed through Quali, which satisfies the minimum 20% required by the guidelines.

Part IV: Survey Results

As mentioned above, the STEM Center is one of the powerful services provided to ASNS students to increase their success, reduce their time to graduation and transfer. The STEM Center provides mentoring support every semester and supports all students taking ASNS courses. In 2017, a web-based evaluation software has been created to gather usage of the ASNS STEM Center mentors. Every time a student benefits from a mentor's help, he/she is also being asked to evaluate the received support via an automatic email linking to a web survey composed of three questions. Fall 2017 was the first semester data was collected with respect to the evaluation of all mentors by students who benefited from their support, and who accepted to participate in the evaluation process.

The data from Fall 2017 and Spring 2018 is tabulated below. Table 2 below describes the evaluation of the STEM Center mentors for each question and per semester.

Table 2: Evaluation of the STEM Center Mentors

	Fall 2017 (N=297, 50.6%)		Spring 2018 (N=127, 36.9%)	
	Mean	Standard Deviation	Mean	Standard Deviation
Was this session useful to help you gain a better understanding of the topics covered?	3.79	0.50	3.91	0.39
Was the mentor knowledgeable in her/his subject area?	3.84	0.44	3.91	0.36
Was the mentor professional in the way she/he mentored you?	3.84	0.46	3.93	0.31
Average	3.82	0.47	3.92	0.35

A Likert scale is used for the three questions of the survey:

- Strongly Agree: 4
- Agree: 3
- Disagree: 2
- Strongly Disagree: 1

Table 2 provides the arithmetic averages and the standard deviations for each question. As the above data highlights, **the evaluation of ASNS mentors is excellent and even improving**. The percentage of students who received mentoring and submitted an evaluation is 50.6% in Fall 2017 and 36.9% in Spring 2018.

Part V: Quantitative Indicators for Program Review (2016, 2017, 2018 ARPD)

Quantitative factors are shown in Table 3 below.

Table 3: Quantitative Indicators

	Demand	Efficiency	Effectiveness	Overall
2015 -2016	Healthy	Cautionary	Healthy	Healthy
2016 - 2017	Unhealthy	Cautionary	Cautionary	Cautionary
2017 - 2018	Cautionary	Unhealthy	Healthy	Cautionary

The following is an analysis of quantitative trends identified over the past three years of ARPD data.

Demand Indicators: The demand indicators lost its "Healthy" status due to a plateauing of the number of majors over the three year period, stagnating from 444, to 434, to 423. It is noteworthy however to observe a more global picture of the state within the last three years. While the number of majors has remain constant, it is first directly linked to the number of our embarrassingly low number of FTE BOR Appointed Faculty (~6), and second it is important to realize that compared to the overall College, our program is actually doing quite well in these last three year as shown in Figure 1:

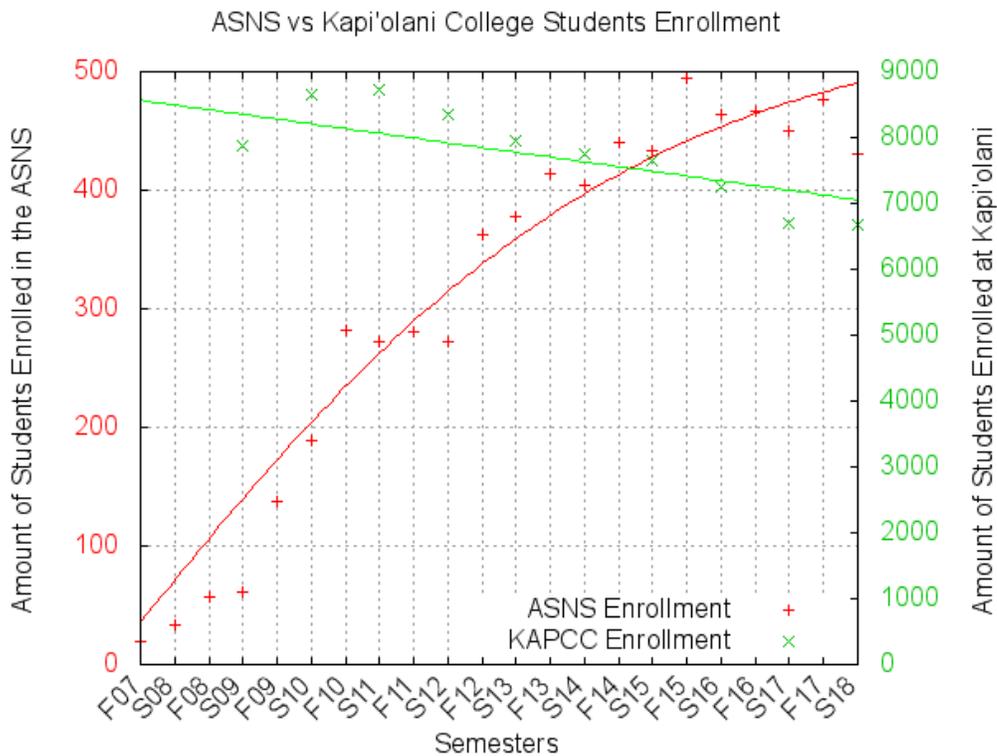


Figure 1: Enrollment Comparison

Another important aspect of this indicator is the number of Native Hawaiian students in the ASNS program which has been increasing with time since the beginning of the degree creation compared to the overall number of Native Hawaiian students across the entire College as shown in Figure 2.

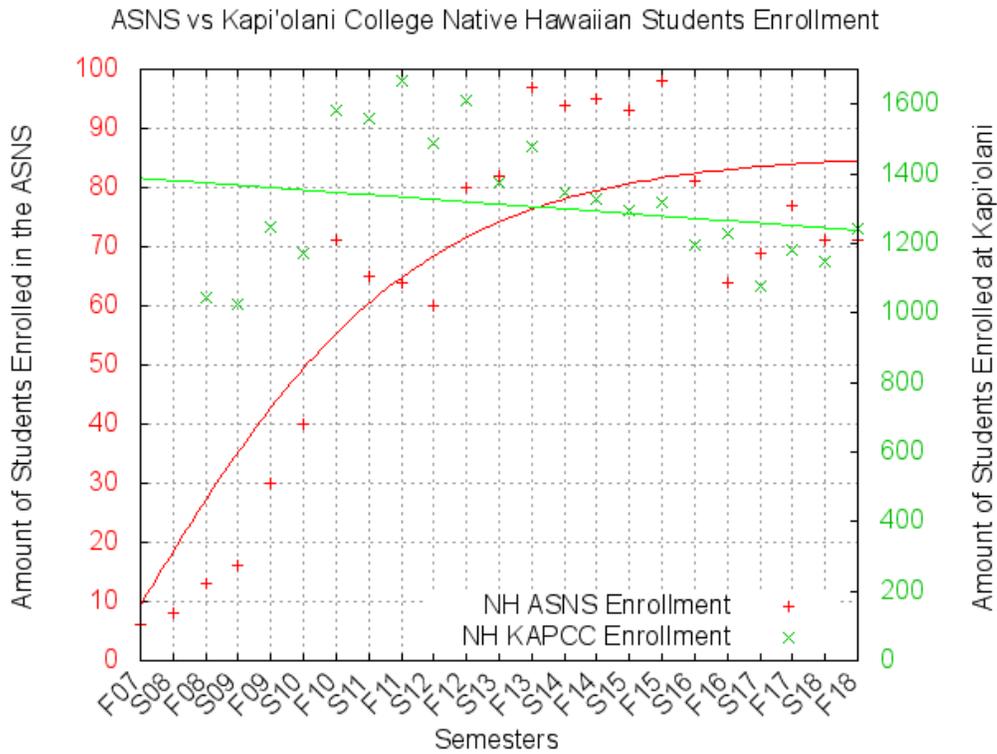


Figure 2: Native Hawaiian Enrollment Comparison.

Efficiency Indicators: The efficiency health went from the "Cautionary" to the "Unhealthy" status due to the high ratio of students to BOR appointed faculty as mentioned above. The student to faculty ratio is "unhealthy" due to the fact that there are only six FTE BOR appointed faculty members in the ASNS program. The faculty members teaching the bulk of the major courses are AA program FTE BOR appointed. As a result, the ratio of Majors to FTE BOR Appointed Faculty (195/1 in the 2015 ARPD) negatively impacts the health status of the program in this category, since a healthy ratio requires 15-35 students per faculty member.

Effectiveness Indicators: The "Healthy" status became "Cautionary" and "Healthy" again. This was due to impressive increases in the number of graduates and transfers, both of which far exceeded the goal each year. Several interventions aimed at improving success in core STEM courses may be credited for the strong showing in this category, including incorporating undergraduate research into ASNS courses. Undergraduate research has been shown to correlate highly with ASNS degree completion and transfer. In addition, obtaining and filling a full-time Engineering position bolstered effectiveness, as there has been an increase in graduation and transfer of all ASNS students as shown in Table 4.

Table 4: ASNS student graduation and transfer

Academic Year	07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18
ASNS Students Graduating	6	5	13	16	23	35	34	68	94	70	107
ASNS Students Transferring		1	5	11	19	35	42	46	78	106	95

Part VI. Analysis of the Program

Alignment with Mission

The ASNS program is principally a degree structured to facilitate transfer in STEM Majors to a four-year university. In order to improve student retention, the ASNS STEM Center provides tutoring 6 days a week.

Mentoring support through the STEM Center

The STEM Center opportunity is one of the major strategies provided to ASNS students and has been operational since 2006. To justify institutional support of its operation, data has been gathered to demonstrate student occupancy of the STEM Center. A login machine has been setup at the entrance of the center and visitors are being asked to enter their UHID when entering.

Table 5: STEM Center Mentoring data.

number of students who came:	F15	SP16	F16	S17	F17	F18
one time per semester	226	362	467	587	778	965
at an average less than one time per week	269	445	563	719	891	1,056
at an average of one time per week	32	50	65	80	113	133
at an average of two times per week	13	17	28	32	34	38
at an average of three times per week	3	11	9	13	24	25
at an average of four times per week	2	5	4	10	12	17
at an average of five times per week	3	4	6	6	11	9
at an average of six times per week	1	0	2	3	5	4
at an average of seven times per week	0	1	2	6	1	5
at an average of eight times per week	0	1	2	6	1	5
Total number of unduplicated visiting students	549	896	1,146	1,456	1,870	2,256
Total number of visits	3,588	2,732	1,845	3,844	4,627	4,557

It is clear from this trend that the STEM Center not only attracts and support more and more students but also that more students are coming back to get support throughout the semesters. The STEM Center is not only a space ASNS students can come - and study in, it is also a powerful service provided to ASNS students to increase their course success, improve their time to graduation and transfer. The STEM Center provides mentoring support every semester and supports all students taking ASNS courses. Fall 2017 was the first semester data was collected with respect to the number of students who are seeking help and in which disciplines.

The data from Fall 2017 and Spring 2018 is tabulated below in Table 6 and describes the number of mentor sessions per disciplines and semesters.

Table 6: Number of mentoring sessions per disciplines and semesters

Disciplines	Number of Sessions	
	Fall 2017	Spring 2018
Biology and Microbiology	23	12
Chemistry and Biochemistry	122	82
Engineering	53	12
Information and computer sciences	73	109
Mathematics	126	61
Physics	136	56
Other	54	12
TOTAL	587	344

It is clear that the demand is mostly in Chemistry, Mathematics, Information and Computer Sciences, and Physics. Due to the usual drop of Fall to Spring re-enrollment, the number of sessions are always lower in spring semesters. Table 2 included in Part IV above describes the evaluation of the STEM Center mentors for each question and per semesters.

KCC Commitments – Outcome 1: Graduation

The ASNS Program is able to report a boost in student graduation in the last several years. The number of graduates has historically been low due to the fact that the majority of ASNS students transfer prior to completing the ASNS degree. However, in the last three years, and specifically due to the tremendous work of the Liberal Arts counselor assigned to help the ASNS majors, Mrs. Lisa Yrizarry identified students who transferred without graduating and/or about to transfer and reminded them to do so. As clearly demonstrated by the trend since 2015 in the Figure below, her committed work caused a significant increase in student graduates. Such increase has been modeled with an exponential function, clearly and directly correlated with Mrs. Yrizarry’s intervention. This is most likely the unique and only program at the College with such graduation outcomes.

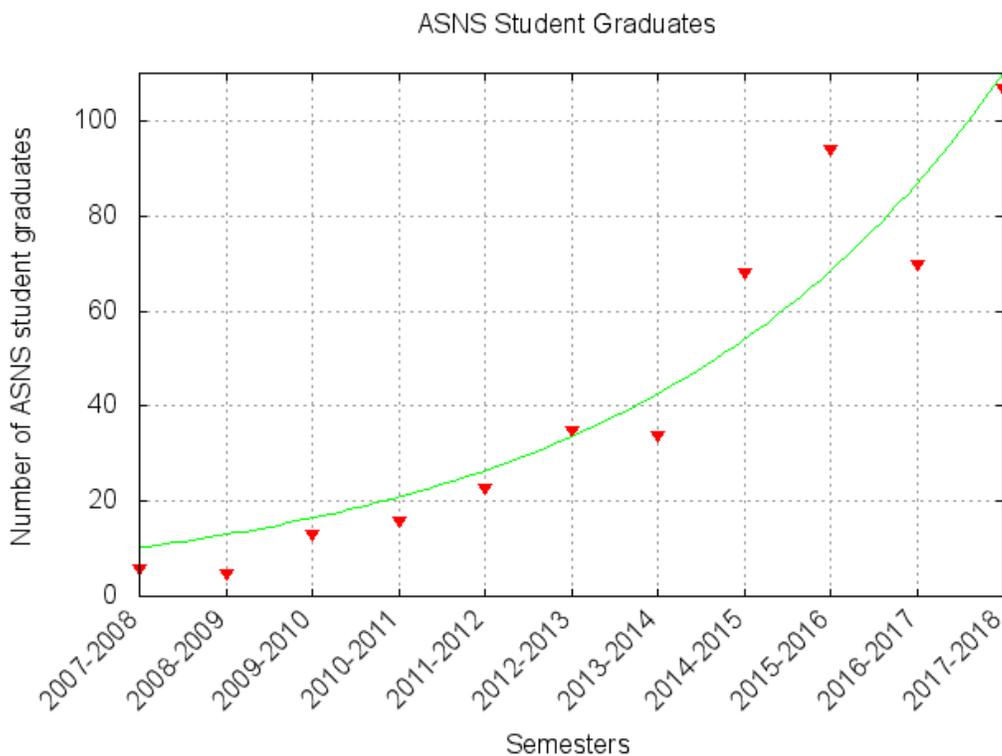


Figure 3: ASNS student graduates

Such herculean efforts provided by Mrs. Lisa Yrizarry affected all ASNS concentrations as demonstrated in Figure 4:

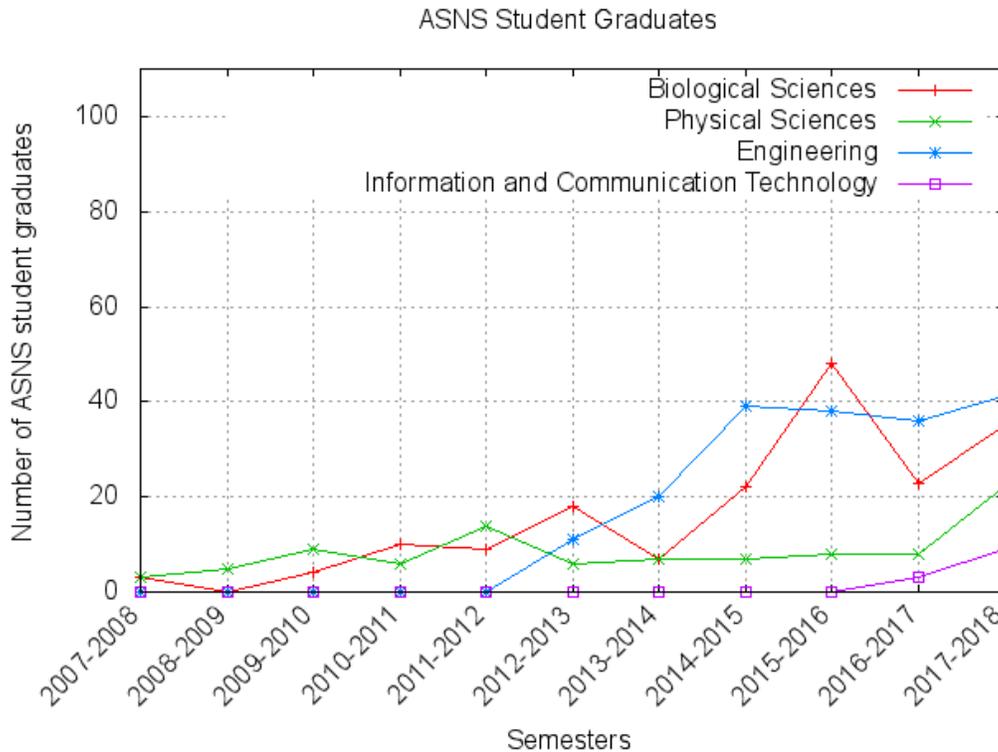


Figure 4: ASNS student graduates per concentration

The number of ASNS student graduates in the last three years have never been that high, and has benefited the College with funding every year in the past three years from the performance measures.

In addition, the ASNS program accomplished increases in transferring students to a four-year university in STEM. As seen in Figure 5, the number of ASNS student transfers has also increased steadily in the last three years. In addition, it should be noted that many students who are also AA degrees also transfer to four-year universities in STEM and are not reflected in these data.

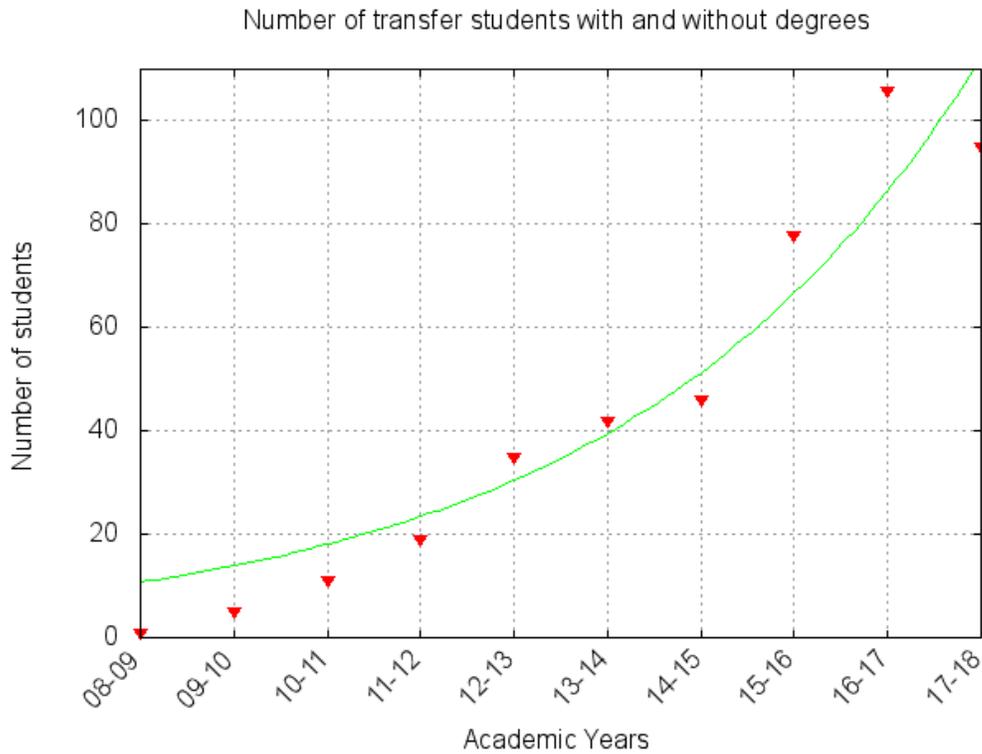


Figure 5: ASNS student transfers

The amount of ASNS student transfers have also exploded in the last three years, which also has been modeled by an exponential function. Again, such astonishing growth in the last three years is most likely unique to the College and is entirely due to Mrs. Lisa Yrizarry who has been helping our ASNS program in addition to her regular work - since we currently have no official ASNS STEM Counselor regardless of the amount of students currently enrolled.

KCC Commitments – Outcome 2: Enrollment Growth

Since 2007, the number of ASNS students has increased significantly. In the last three years however, even with a significantly increase of students transfer and graduation, the ASNS enrollment has plateaued as shown in Figure 6. Our department seems to have reach critical mass. Such plateauing is directly related to the limited number of FTE BOR appointed faculty members in the ASNS program and the amount of limited classroom space.

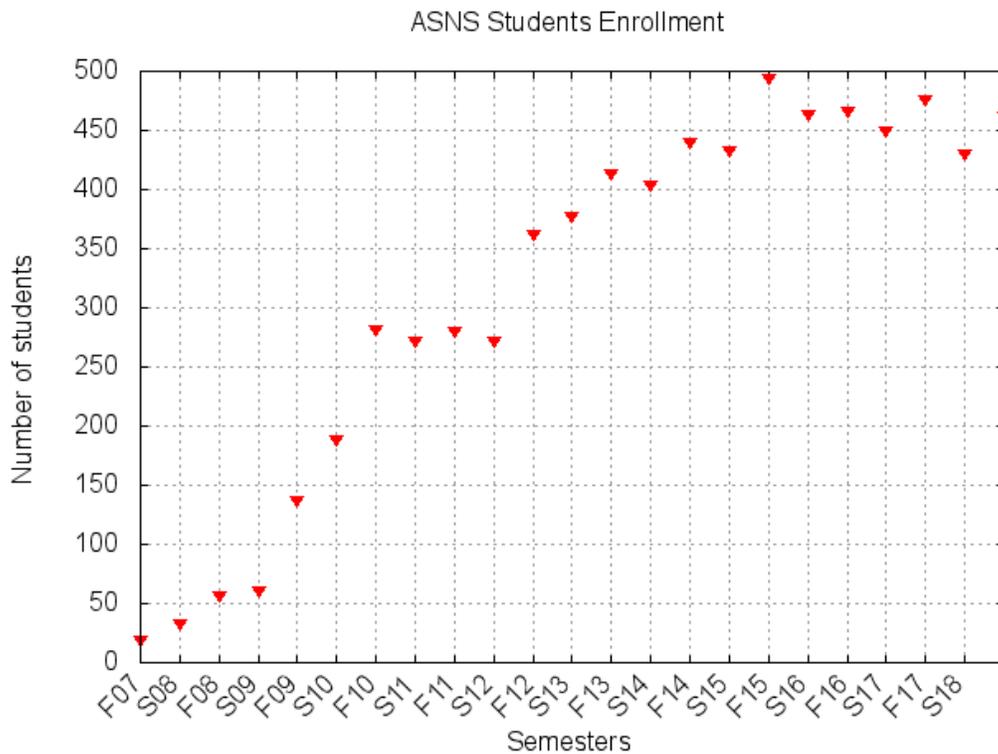


Figure 6: ASNS Students Enrollment

KCC Commitments – Outcome 3: Innovation

In the last 3 years, the Math and Science has provided an increasing number of Research Intensive (RI) lecture and research courses for ASNS students (SCI 295) in order to provide students with research skills gained through applying the scientific methods through hands-on projects. The power of RI designation courses is the ability to provide research experience to students within existing courses. Six lecture and laboratory courses are currently offered with a RI designation. The SCI 295 courses also provide students with the additional opportunity to conduct their own research of interest with the supervision of a faculty member. To this date, nine topics of research are provided to students.

The students enrollment in these courses has plateaued over the last three years as shown in Figure 7, providing evidence that students are still interested in conducting research and value such experience.

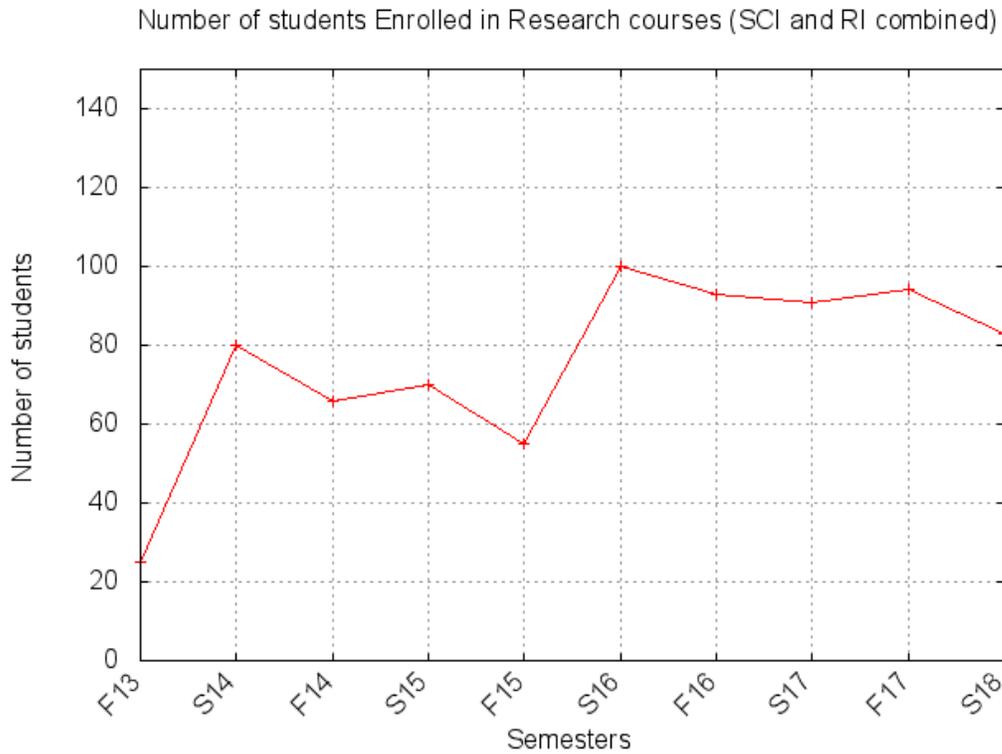


Figure 7: RI and SCI 295 Enrollment

While the number of students enrolled in RI and 295 courses has plateaued, the number of students presenting their research has exploded at the semester SURF event, and suggests that more and more students – not only in ASNS – but across disciplines are engaged in innovative and potentially transformative research “treatment”.

The SURF event has hosted 133 students in Fall 2016, 148 in Spring 2017, 192 in Fall 2017, and 304 in Spring 2018. Such astonishing numbers suggest that the ASNS program is fulfilling students’ needs by offering innovative educational models to its students. Undergraduate research experience is an opportunity that ASNS students welcome and embrace, and other disciplines have now begun to implement it as well. The importance and value of undergraduate research is seen in the fact that the 2015-2021 Strategic Plan of the College includes the number of ASNS students participating in undergraduate research as one of its measured outcomes.

Current Situation: Internal

Strengths

Strengths of the ASNS degree program are in its ability to submit and receive grants, which in turn provides the college with funds through indirect costs (currently at 45%). Several initiatives funded by the National Science Foundation (NSF) grants were implemented over the past several years and contributed to the success of the program. A group of very engaged faculty members invested a lot of time and effort to implement the strategies that have been shown to promote student success. In the last three years, faculty members have volunteered their time to write and submit NSF proposal with the continuous support of Mr. Brandon Higa. Several of these proposals have been awarded as shown in Figure 7:

Table 7: Grants obtained by the ASNS program

Grant Name	Founders	Description	Total Amount	Indirect Cost Amount
PEEC 2	NSF	Collaborative grant: The purpose of the grant was to continue the effort of the first PEEC grant to support the transfer of Native Hawaiian and other under-represented students from all community college partners to the College of Engineering at the University of Hawai‘i at Mānoa.	\$494,973	\$109,278
LSAMP	NSF	Collaborative grant: The purpose of this grant is to support minority students enrolled in the ASNS degree across community partners by providing them URE or mentoring opportunities until they transfer to a four-year university in STEM.	\$1,485,100	\$59,600
S-STEM	NSF	The primary goal of this project is to develop financial and programmatic supports for talented, low income Native Hawaiian and other underrepresented students to complete the College’s 2-year Associate in Science in Natural Sciences (ASNS)	\$1,000,000	\$110,856

		degree, successfully transfer and persist in their junior and senior years, complete UH Mānoa STEM baccalaureate degrees.		
Project IUMA	NASA	Collaborative grant: Its purpose was to engage students in space-related engineering projects involving scientific payload specifically.	\$499,967	\$0
Space Grant	NASA	Two supplemental grants to support URE travel for Engineering ASNS students.	\$33,000	\$13,000
MEIM	NSF	The purpose of this Math Emporium Model was to support ASNS students engaged in an innovative Mathematics program,.	\$299,979	\$76,566

The total amount from the above grants obtained by the ASNS STEM Program provided a total amount of **\$369,300** in indirect cost to the College.

Two proposals shown Table 8 are also currently pending, which if awarded will provide an additional **\$75,871** of funds in indirect cost.

Table 8: Grant proposals submitted by the ASNS program

Grant Name	Founders	Description	Total Amount	Indirect Cost Amount
PEEC 2	NSF	Supplemental grant to continue PEEC 2 for an additional year.	\$98,994	\$17,302
SGR	NSF	The purpose of this research project is to provide ASNS students all the necessary skills to be successful in calculus through a one-semester Learning Community Mathematics Immersion and Physics Integration (MIPI) Program.	\$199,698	\$58,569

These NSF grant-funded strategies and activities helped Native Hawaiian and all ASNS students achieve success (Degree Completion) in the program. These initiatives included: scholarships, peer mentoring, Peer Led Unit Study (PLUS), accelerated courses, undergraduate research

experience (URE), internships and advising. All mentoring activities contributed immensely to student success in the challenging ASNS major courses and thus contributed to persistence in the ASNS degree program as described above with the STEM Center mentoring data.

Threats

Several funding issues threaten the program's effectiveness: loss of continuous NSF grant funding Math and Science department budget decrease, the low number of BOR appointed faculty (6), lack of APT support for laboratory courses, lack of STEM counselors, and lack of space which prevent further growth as required by the community college system to meet performance measures and thus receive funding.

Despite efforts to renew federal grant funding from the NSF, much of the grant funded awards are lower than in the past. Unless the College can find a way to institutionalize the support of grant writing, a decrease of grant obtention may follow. This is likely to affect the effectiveness of the ASNS degree program in the future.

In addition to the decrease of grants, the budget in the Math and Sciences department has dramatically decreased as shown below:

- 2012/2013: \$952,075
- 2013/2014: \$887,977
- 2014/2015: \$883,808
- 2015/2016: \$614,634
- 2016/2017: \$649,353
- 2017/2018: \$598,711

More than half of the ASNS courses (18/34, or 53%) are either lab courses or other applied courses that require materials to be purchased through the department budget. Since the budget has been cut so severely and other purchasing limitations were instituted, materials that were needed to provide fully engaging course activities could not be purchased.

As mentioned earlier in this document, the astonishing low number of BOR appointment faculty for the ASNS degree (~6) in the last three years, prevents our program to not only provide adequate retention support to our ASNS students, but more importantly prevents our program to growth, which in turn makes it more and more difficult to meet the performance measure goals of 3% annual increase in students graduation and transfer. Yet, even with such hindrance, the ASNS program and their faculty from the Math and Science department have been instrumental in allowing the college to receive some of that performance measure funds; specifically, the STEM Degrees & Certificates. For the last **4 almost consecutive years**: in 2013-2014, 2015-

2016, 2016-2017, and 2017-2018! (nothing was awarded in 2014-2015 as the new strategic plans were being developed). For the ASNS program to continue attempting to meet such annual increase, the number of BOR appointed faculty must be provided by the administration.

Another significant internal threat is the ongoing lack of space dedicated to Natural Sciences use. Appropriate laboratory spaces which allow adequate water flow, drainage, ventilation, bench space, preparation space, and storage are not available. Some of the available lab space has roof leakage issues, and the air conditioning units are in disrepair. Such drastic water leaks has condemned 20% of the STEM Center space, created an unsafe additional area with pvc pipes whose purpose is to drain excess water from the leak into a bin, located almost in the middle of the STEM Center. In addition, such incessant leaks disturb the delivery of laboratory courses every time they occur. These issues threaten expensive lab equipment and supplies.

In addition, the APT laboratory technician staffing for all the laboratories offered in the Math and Sciences department is very limited. In a typical semester the department offers 80-100 laboratory sections serving 1600 – 2000 students. All of the preparations for these lab sections are handled by only two APTs. This is unsustainable and has non-negligible safety and compliance implications. This CPR has identified this lack of dedicated space as a factor that will continue to limit the potential expansion of this program of study. Such state-of-affairs has been reported in the last two ARPD reports but has never been addressed. Our college has two APT members who are responsible for setting up ~40 laboratory courses each. This does not even include Physics and Engineering for which no APT has ever been allocated for the last twenty years. In comparison, APT members at LCC, HCC, and WCC are responsible for half this amount (between 15 and 20). This situation is very precarious to say the least as it may lead to serious safety issues. To make it worse, classes offering undergraduate research (RI and SCI 295 classes) represent an additional work not tabulated in the above numbers and are doomed to be limited by the lack of space allocated and APT support to do undergraduate research. The College must be committed to an increase in space dedicated to Natural Sciences lab courses and undergraduate research.

Faculty positions left vacant due to resignation or retirement should be considered for recruitment.

The number of MATH FTEs has decreased to a number that is unhealthy for the program and needs attention. Yet, Mathematics is a discipline that the Math&Science department provides support for and is necessary for students who are also not ASNS majors.

Another discipline in jeopardy is Physics. Currently 33 credits of physics courses each year are allocated primarily to engineering faculty and/or lecturers when available. Yet, Physics represents the core of two ASNS concentrations: PS and ENGR. Without additional BOR

appointed faculty, the ASNS program will not be able to continue providing the necessary courses and laboratory for students to graduate on time.

In addition, the explosion of student enrollment in ICT concentration (0 in 2015 and now 50 in 2018) shows clearly that the addition of one BOR appointed faculty in ICS was a clear benefit, and is directly linked to the increase and success of this discipline. However, one faculty is not enough to continue growing, and an additional member is going to be required to sustain such increase.

Last, Geophysics is currently taught by one C level lecturer. Simple mathematics reveals that providing the ASNS program with a full-time position in Geophysics would allow the College to 1) save costs 2) invest in the development of Geoscience feeding to the SOEST program at Mānoa AND, also support the Physics discipline (as a M.S. holder in Geo**Physics** clearly is able to teach 100 to 200 level Physics).

Assessment Results for Program S LOs

All program SLOs have been assessed in the last three years through the SURF symposium. Since URE represents a student achievement comparable to a capstone project and has so many students engaged in it (~100 per semester), it was natural to use this artifact to assess the program since the questions developed to assess the hallmarks and required outcomes of URE projects have been aligned with the ASNS program SLOs as shown in Figure 8 below:

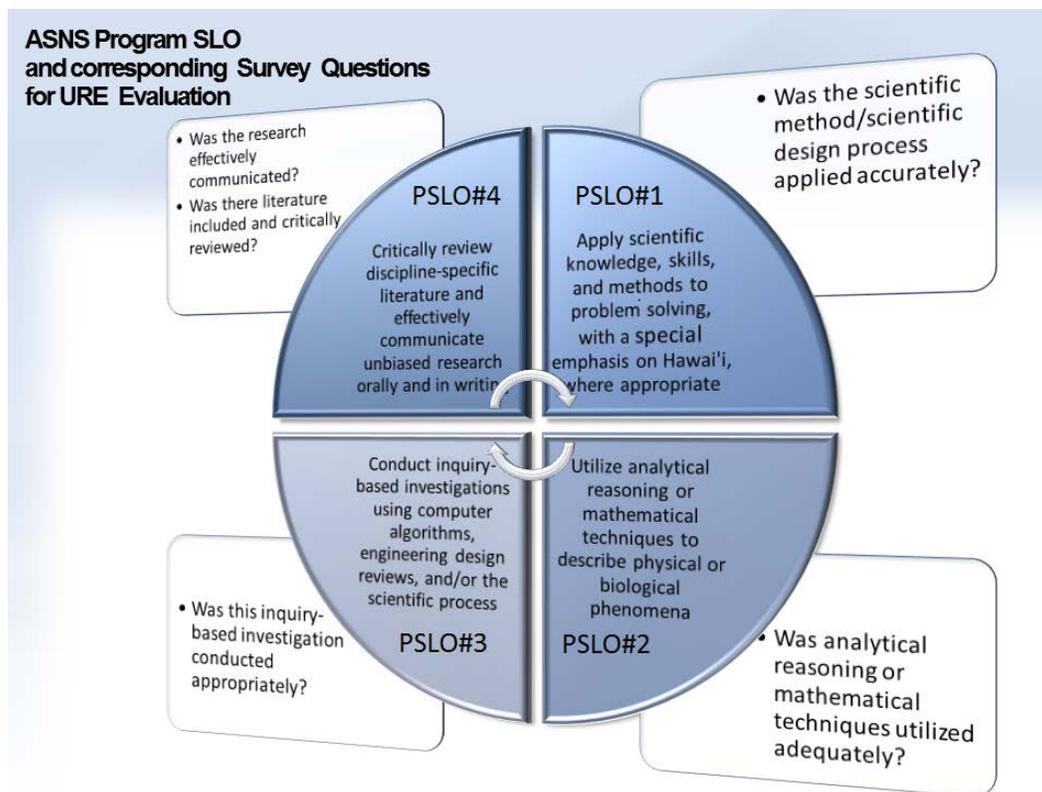


Figure 8: PSLO linked to Assessment rubric

A Likert scale was used for all questions: SA: Strongly Agree, A: Agree, D: Disagree, and SD: Strongly Disagree. The number of scoring tabulated was 210 and is summarized as follow:

SLO #1, #2, and #3: 100% of respondents strongly agreed or agreed to its the successful achievement compared to 93% for PSLO#4. Hence, overall, the assessment performed by faculty and students supports the hypothesis that the program SLOs have been accomplished successfully. Details are shown Table 9 below:

Table 9: ASNS PSLOs Assessment

PSLOs	Strongly Agree	Agree	Disagree	Strongly Disagree
#1	71.4%	28.6%	0%	0%
#2	64.3%	35.7%	0%	0%
#3	57.1%	42.9%	0%	0%
#4	67.9%	25.0%	3.60%	3.60%

In the next five years, and in order to demonstrate a solid assessment strategy as well as to provide valuable data demonstrating the health of the ASNS program to the next accreditation body, a new assessment strategy that has been developed and approved by all Math and Science course coordinators, will be implemented.

The new assessment method will involve the creation of a matrix alignment of all ASNS course SLOs with the four ASNS PSLOs, the extraction all data from Taskstream, the renormalization and the aggregation of all ASNS course SLO assessment data according to their mapping to the PSLOs. The outcomes of such strategy will be a clear assessment of the ASNS program entirely based on the assessment of the ASNS courses through a symbiotic alignment of SLOs and PSLOs². No identifiers will be present in the compiled results that allows the readers to identify specific courses, sections, and/or faculty members.

Part VII: Tactical Action Plan, 2015-2021

The ASNS program is directly linked to the following measures of the College Strategic plan items:

Outcome 1 Increase the number of graduates and transfers and reduce their time to completion by investing in student services and supporting learning in and out of the classroom.

(E) Increase annual STEM certificate and degree completers at KCC and UH 4-year by 5% from 166 to 243.

(F) Close Native Hawaiian success gaps in percent of all and STEM degrees and certificates, and 4-year transfer

(G) Close Filipino success gaps in percent of all and STEM degrees and certificates, and 4-year transfer.

(H) Close Pacific Islander success gaps in percent of all and STEM degrees and certificates, and 4-year transfer.

(M) Increase the annual number of students participating in the ASNS degree by 6% from 356 to 535.

(N) Increase the annual number of ASNS students transferring to UH 4-year campuses by 6% from 42 to 64.

(O) Increase the annual number of students completing ASNS undergraduate research experiences and research.

(P) Increase the annual number of students completing the ASNS degree by 10% from 30 to 60.

These measures pertain directly to:

- 1) ASNS graduation
- 2) ASNS transfer
- 3) Continuation of URE
- 4) Focusing on Native Hawaiian, Filipino, and Pacific Islander students

² Excited yet? ;)

In order for the ASNS program to continue being an instrumental factor in affecting the achievements of the above measures, the projections in the next five years are to:

- 1) Obtain at least one STEM counselor; none of the above can be reached given that the number of ASNS students is 450.
- 2) Sustain the offering of fundamental courses required not only by the College but also by the program: Mathematics, and Chemistry by increasing the number of BOR appointment faculty in these disciplines (a significant amount of KAPCC students have been taking their Mathematics (1829) and Chemistry (611) courses in other CCs³ from 2015 to 2019).
- 3) Sustain the offering of specific discipline courses required for the completion of the four ASNS concentrations: ICS and Physics/Astronomy by increasing the number of BOR appointment faculty in these disciplines (a significant amount of KAPCC students have been taking their ICS (168) and Physics/Astronomy (330) courses in other CCs⁴ from 2015 to 2019).
- 4) Continue the offering of Geophysics courses by adding one BOR appointment faculty in this discipline, or such offering will have to be discontinued entirely in the next year or so due to a short projected timeline of our unique lecturer retirement date (a significant amount of KAPCC students have been taking their GG courses (393) in other CCs⁵).
- 5) Continue the offering of Physiology courses by increasing the number of BOR appointment faculty allowing us to advertise past retired faculty members and future ones.
- 6) Continue to submit grant proposals given that faculty and/or APT member participating in the writing received financial compensation based on the amount of the requested grant: 5%. This amount would be provided upon acceptance of the proposal and distributed back to writers from indirect cost throughout the implementation of the grant. This initiative would contribute to closing the budget deficit gap of the college.
- 7) Continue to offer URE opportunities given that adequate financial support is provided in supplies, equipment, space, and with a URE coordinator position.
- 8) Continue to offer laboratories courses given that one of our current APT positions remains with us and becomes permanent as well as an additional APT position be provided to the program.
- 9) Request a STEM account in order to clarify the ASNS financial support and allow us to plan better in allocating funds for students.
- 10) Conduct an in depth data analysis of the ASNS student population will be done each semester with STAR data in order to 1) implement early intervention to students with poor GPA and/or delay in graduation 2) identify courses with high attrition in order to

³ Data provided by the Dean of Arts and Sciences.

⁴ Data provided by the Dean of Arts and Sciences.

⁵ Data provided by the Dean of Arts and Sciences.

allocate funds to implement innovative teaching strategies supported by technology 3) track students demographic and ethnicities in order to employ retention emphasis to specific ethnic groups 4) track four-year major into which ASNS transfer into. However, this cannot be achieved if non STEM counselors are provided to the ASNS program.

- 11) Continue our efforts given that the Chancellor's vision (and priorities by making STEM her first one), is shared and provided with funds so that we can align our strategies and ensure their symbiotic effects with her global vision.
- 12) Continue a synergy effect with other programs at the College such as the Maida Kamber Center CELTT, the Library, & Testing, Achieving the Dream initiative & Title III, the Student Services, CTE and Health Academic Clusters, BLT Department, Ka'ie'ie and other university pathways, OFIE and Service Learning, the Business Office, and the Human Resources Office.

Part VIII. Resource and Budget Implications

The number of ASNS majors has been growing at a steady rate, and the College's goal is for continued growth over the next five years. Funds will be needed to continue to support the disciplines enrolling large numbers of intended transfer students, which include all concentrations in the ASNS. Funds and resources will be needed to support the following ARPD data-driven needs:

1. New APT Position for Undergraduate Research Support is needed⁶ to continue the work of coordinating the undergraduate research initiatives on campus so that the burden does not fall solely on the faculty mentors.
2. Secure the second laboratory coordinator APT position by making it permanent, and obtain an additional one to support the offering of Laboratory courses and close the gap of inequality between Kapi'olani and other CCs.
3. New BOR appointed faculty position in ASNS in order to continue meeting the performance measures, specifically in Mathematics, Physics, Geophysics, Chemistry, and ICS.
4. At least one ASNS counsellor to sustain retention efforts for the ASNS students to close the gap of inequality between the ASNS program and other program at the College with less students and more dedicated counsellor positions.
5. Space for students to conduct research is desperately needed. Undergraduate research experience (URE) has been identified as a best-practice for student transfer and success and has been described at length in grant reporting as a key factor in the success of the ASNS program.

⁶ While this has been approved as this document is written, the recruitment and training needs to proceed without delay.

6. The Math and Sciences budget needs to be restored so that the ASNS courses can have supplies to provide rigorous science and engineering instruction with engaging course activities.
7. Laptops for some of the laboratory classes need to be replaced. Some of these laptops have been in use for more than 7 years. These laptops are needed for data gathering and analysis in the laboratory, RI, and SCI 295 classes.
8. Financial compensation for faculty and/or APT member willing to write and submit grants.
9. A new roof for KOKIO building so we stop getting wet, our equipment does not get ruined, and our STEM Center usable 100%; or better yet, a complete renovation of the building.
10. Smart boards for all STEM disciplines in order for faculty to provide top quality and innovative education.