2024 Annual Report of Program Data
Associate of Science in Natural Science

1. Program or Unit Mission

The purpose of the Associate of Science in Natural Science (ASNS) degree is to address the needs of students interested in careers in science, technology, engineering, and mathematics (STEM). There are three ASNS concentrations: Biological Sciences, Physical Sciences, and Engineering. Each provides a clear pathway to properly prepare students for transfer with core introductory courses and labs in biology, chemistry, engineering, math, and physics typically required in the first two years of a broad range of science and engineering baccalaureate degrees at four-year universities. Students can use the AS degree in Natural Science to better market their science background for a science technician position or transfer to a four-year institution and prepare to join a larger and stronger STEM workforce in Hawai‘i.

College Mission Alignment
Kaua‘i Community College is a kahua that inspires, engages, and empowers learners and educators to enrich our community and our world. The ASNS program supports the mission by providing a quality instructional program that has produced graduates who have completed the ASNS degree and are well prepared for successful transfer to a UH or other four-year university and will, or already have, entered and enhanced the STEM workforce benefitting Hawai‘i.

2. Program Student Learning Outcomes or Unit/Service Outcomes

a) Program Student Learning Outcomes

1. Analyze data effectively using currently available technology.
2. Communicate scientific ideas and principles clearly and effectively.
3. Analyze and apply fundamental mathematical, physical, and chemical concepts and techniques to scientific issues.
4. Apply fundamental concepts and techniques in their chosen natural science field of study, such as biology, chemistry, engineering, physics, etc.

b) Program Outcomes that have been assessed in the previous year

Table 6 PSLO Assessment Metrics

PSLO Assessment	Metrics recently used
1. Analyze data effectively using currently available technology.	Two labs in PHYS 170L in F23 utilizing mathematical modeling of collected data. An individual student meets the benchmark by scoring

	80% or greater on the relevant questions (an increase from 75% in 2021-2022). This benchmark is admittedly high.
2. Communicate scientific ideas and principles clearly and effectively.	Assessed in PHYS 272L: Subjective analysis of scientific writing in PHYS 272L in S24, e.g. Rubric on detailed laboratory write-up. An individual student meets the benchmark by scoring 75% or greater on the relevant questions
3. Analyze and apply fundamental mathematical, physical, and chemical concepts and techniques to scientific issues.	PHYS 170/272 for physical science and engineers or PHYS 151/152 for life sciences were assessed separately. Assessed in PHYS 170/272: Longitudinal objective assessment of 2-D vector addition problem presented in PHYS 170 compared with results in PHYS 272. The PHYS 151 assessment included six questions focused on the quadratic equation.
4. Apply fundamental concepts and techniques in their chosen natural science field of study, such as biology, chemistry, engineering, physics, etc	First Assessment of PSLO #4, using a survey question regarding students' opinion on whether course content will be relevant to their future studies.

c) Assessment Results and Improvements

Table 7 PSLO Assessment Results

PSLO Assessment	% Met Benchmark 2022 (2021 result)	Comments
1. Analyze data effectively using currently available technology.	52.4% (71.4% in fall 2022)	The success rate and participation rate are lower than expected. Many students choose not to do either lab, an unfortunate result of these labs being held at the end of the semester as well as possible declining intrinsic motivation of students.
2. Communicate scientific ideas and principles clearly and effectively.	40% (65% in spring 2023)	All students taking the assessment met the benchmark in spring 2024. All students who did not meet the benchmark failed to complete other homework assignments and assessments in the course.

3. Analyze and apply fundamental mathematical, physical, and chemical concepts and techniques to scientific issues.	PHYS 170: Part A vector magnitude (82.6% correct); Part B vector angle (61% correct) in 2023-2024 [PHYS 170: Part A vector magnitude (100% correct); Part B vector angle (47% correct) in 2022-2023. **PHYS 151**: Over 50% of students answered all six questions correctly. Q3 remained the most problematic, with 52% answering it correctly in F23. [PHYS 151: 23% answered Q3 correctly and 37% answered Q6 correctly in F22]	PHYS 170/272 Longitudinal study: Results similar to previous years, which is not surprising given that essentially nothing was changed in the PHYS curriculum on this topic and good coordination with math faculty, thus it is not a great surprise that students are rather successful (especially at finding the magnitude of a vector), and less success at writing the angle properly, much of this is attributed to significant figure errors, rather than a fundamental misunderstanding of proper calculation or quadrant placement. **PHYS 151**: Changes implemented led to improved results on students' lowest question scores, question #6 (Q6) and question #3 (Q3). Student scores on Q6 improved from 23% in 2022 to 72% (an improvement of 49%). Q3 scores improved from 37% 2022 to 52% in 2023 (an improvement of 15%). This shows the in-depth analysis of our assessment data has led to more thoughtful scaffolding of curriculum, leading to better student success. As well, this validates the effect of participation and optional practice, unsurprisingly with mandatory participation improving results more. In the future, the participation vs practice question can be switched to test the effect on students, further illustrating differences in mandatory participation vs optional practice.
4. Apply fundamental concepts and techniques in their chosen natural science field of study, such as biology, chemistry, engineering, physics, etc	70% incorrect on 1st attempt (N/A in spring 2023)	70% of students believe the content of this course will be relevant to their future studies, with many indicating they believe the electrical portion would be quite relevant.

d) Changes that have been made as a result of the assessment.

For PSLO#1, in fall 2024, a bonus question is added to the spring lab in hopes of increasing extrinsic motivation (students can increase their lab grade by participating in this lab). As well, a large curriculum change in preparation for lab #4 has been implemented in fall 2024 in hopes to better help students model data (as a quadratic function at this point in the semester). It is hoped the curriculum change will also serve to better prepare and motivate students towards the end of the semester. For PSLO#2, the task is to try to improve intrinsic motivation to both master the material and attempt the assessment. For PSLO#3, the relevant curriculum will be maintained to see if improvements seen in the previous academic year persist. For PSLO#4, an additional question will ask how students think the course could be more relevant in the future, although establishing a baseline in a second year (with the same questions) is a good statistical idea before making changes.

The modest changes above are discussed with full knowledge that the value of program assessment comes from the process of carefully considering what students should learn and how to assess student learning. Assessment plans have been continually adapted and improved as noted. PHYS 272L was identified as an ideal course to run summative program assessments since students in all ASNS concentrations must take this course and it is generally taken in their last semester at Kauaʻi CC. However, some Kauaʻi CC students are not assessed because not all ASNS students take PHYS 272L at Kauaʻi CC before transferring within Hawaiʻi or out of state. Further, some students from other UH campuses are taking only their physics courses at Kauaʻi CC, which limits the utility of the results for the purpose of assessing Kauaʻi CC's ASNS program.

3. Analysis of the Program/Unit

Some specific events and plans for the coming year are highlighted below. The ARPD metrics are further discussed below.

Collaboration with academic counselors to improve demand and performance indicators. The ASNS program and Counseling office continued efforts to improve persistence by identifying and addressing students at risk of stopping out. Efforts will continue to improve Native Hawaiian completion. Counseling also helps the program coordinator identify students eligible for certain NSF awards that provide financial support to Native Hawaiian and other minority students. These students can receive financial support to facilitate persistence and research projects to gain research experience and explore career opportunities.

New Environmental Science ASNS concentration: The UH system has still not permitted Kauaʻi CC to implement an Environmental Science concentration. The main issue is the large disparity in requirements across the UHCC system for the existing Biological Science concentration. The program coordinator actively participated in two, year-long ASNS curriculum working groups. One produced a (near) consensus curriculum for the ASNS Biological Science concentration. The other working group focused on bridging the gap between the Natural Resources high school academy

curriculum and BS in Natural Resources and Environmental Management at UHM. The product of the working group was an articulation agreement that is pending.

Discussion of instructional program ARPD Program Quantitative Indicators follows. Refer to tables in the link.

Demand Indicators: Demand is close topre-pandemic levels from the nadir in 2021-2022. The number of full-time students increased from 17% from the nadir in fall 2020-2021 to 44% in fall 2023-2024. Likewise, total SSH in all program classes climbed from a low of 990 in 2020-2021 to 1,242 in 2023-12024, which is very close to the pre-pandemic 2019-2020 academic year (1,387). The near complete return to 2019-2020 pre-pandemic numbers is more remarkable considering fewer 18-yr-olds are finishing high school each year over the last five years.The ASNS program will explore ways to improve enrollment and be accountable (more below).

Efficiency Indicators: Efficiency is holding steady over the past five years. And class size, fill rate, and Majors to FTE BOR Appointed Faculty all remained unchanged relative to the previous year.

Effectiveness Indicators: The degrees completed doubled from five to ten. Kauaʻi CC has retained the highest ASNS degree completion ratio of all UHCCs, i.e. 10 degrees to 37 majors, or 27%). The number of transfers to UH universities decreased from seven to five. For context, typically about 85% of students who transfer from Kauai CC's ASNS program in a given year transfer to a UH university. And while fall to spring persistence improved from 60% to 70%, fall to fall persistence regressed from 41% to 36%.

Distance Indicators: Distance indicators show the number of students enrolled in distance education courses have fallen dramatically from their pandemic high of 443 in 2020-2021 to 213, which is still far greater than before the pandemic. Just two students were enrolled in distance courses in 2019-2020.

Performance Indicators: Fewer Native Hawaiian students enroll in the ASNS program compared to the campus demographic. Of those that enroll, slightly fewer Native Hawaiian students complete the degree when compared with other demographics. This latter parity gap is relatively small, i.e. 19% enrollment leading to 15% of degrees. The action plan will elaborate on efforts to close these gaps.

4. Action Plan

Some specific events and plans for the coming year are highlighted immediately below. The action plan table further below summarizes general categories of actions, benchmarks, outcomes and implementation.

a. **Outreach to university programs:** The program will meet with engineering faculty and undergraduate advisors from UHM to discuss ways to facilitate transfer and success of Kauaʻi CC students.
b. **Continued collaboration with academic counselors to improve demand and performance indicators**: The program will identify students eligible for certain NSF awards for Native Hawaiian and other traditional minority students (current funding through 2025 via an NSF Bridge to Baccalaureate grant).

c. **ASNS Biological Science Concentration and NREM articulation:** The program will follow up with the UH System for guidance on any system-wide agreement for the ASNS Biological Science concentration curriculum. Follow up will also occur with UHM NREM programs on articulation agreement. The program coordinator will advise students regarding BS degree options.

Goal	Strategic Goal/Priority (List number)*	Benchmark in CPR (AY 22-23)	Desired Outcome	Unit of Measure	Year(s) Implemented
Expand outreach to universities & high schools	Imperative 2-3:	Enrollment of majors (38) in AY22-23	Increased enrollment	Number enrolled	Ongoing
Identify and address barriers to completion	Imperative 2-3:	Unduplicated degrees (6) in AY22-23	Increased completers	Number completing	Ongoing
Expand collaboration with counselors & universities	Imperative 2-3:	Transfer to UH universities (7) in AY22-23	Increased transfers to UH universities	Number transferring	Ongoing
Implement a new ASNS Environmental Science concentration	Imperatives 1-3:	New Environmental Science concentration implemented	New Environmental Science concentration implemented	New Environmental Science concentration implemented	AY24-25 or AY25-26
Continue meaningful use of PSLO assessment	Imperative 2:	Existing PSLO assessment plan	Plan changes or other actions developed and implemented	Well-justified data-driven changes	Ongoing/continual
Ensure Engineering students have access to EE 160 or ICS 111	Imperative 2-3:	EE 160 or ICS 111 offered at least once every other year	EE 160 or ICS 111 offered at least once every year;	Number of key courses offered per year; number of students served	Ongoing

*All Strategic Goals and Priorities are Aligned to the College Mission.

5. Resource Implications

One (1) FTE Physics instructional position. There is clear potential to increase headcount enrollment, increase program and overall SSH, and boost fill rate for program courses. The current FTE load of physics courses regularly reaches (26 TEs vs 27 TES for a full load) of physics courses, PHYS 151, PHYS 151L, PHYS 170, PHYS 170L, PHYS 152, PHYS 152L, PHYS 272, PHYS 272L, and PHYS 101 (the latter is a course, PHYS 101: CTE physics, is outside the ASNS program). All of these courses have filled to maximum capacity with waitlists for the last three years (with the exception of PHYS 101). An instructor could easily exceed the maximum allowable teaching equivalencies by simply offering a second section of PHYS 151/152 year-long sequence with labs, making for 34 TEs. The load could be boosted to 37 TEs or more by adding PHYS 101 through Early College. This position hire will be cost-neutral because a high-level lecturer has been teaching program physics courses for several years. **COST: salary and fringe benefits for one instructor though, as mentioned, this position hire will actually be cost-neutral because a high-level lecturer has been teaching program physics courses for several years. Date Needed: Fall 2025.**

Renovate the NSCI 107 Classroom:. Renovation or removal of multiple gas and sinks lines lining the center of the classroom that are obsolete and a potential hazard. Decaying cabinets and shelving will be replaced; **COST: $1,500,000 (See item #1 on fall 2024 Kauaʻi Community College MCIP 6- Year Plan)**