

Natural Science



ANNUAL REPORT OF PROGRAM DATA **2021**



UNIVERSITY of HAWAII® MAUI COLLEGE

1. Program or

Unit Description

Program description

The Associate in Science degree in Natural Science (ASNS) provides a comprehensive background in science and math designed specifically for students who plan to pursue baccalaureate studies in science, technology, engineering, and mathematics (STEM), or who plan to continue with professional studies, such as pre-pharmacy, pre-medical, or pre-dental programs. The ASNS curriculum provides a seamless pathway for students intending to transfer into a STEM degree at a four-year institution, in particular within the UH System where students may take advantage of transfer agreements with UH Mānoa, UH Hilo, and UH West O'ahu. Students may choose to concentrate in biological sciences, physical sciences, engineering, or information and communication technology.

Target student population

The program targets high school students and returning students interested in STEM-related fields and planning to transfer to a 4-year institution.

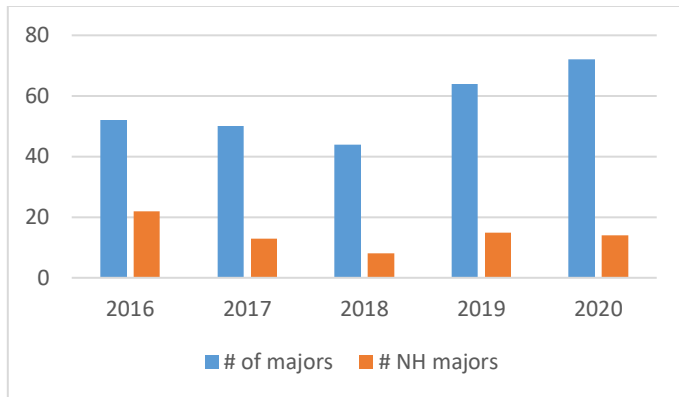
Articulated pathways for 4-year institution

A Memorandum of Agreement (MOA) exists between the University of Hawai'i Community Colleges (including the University of Hawai'i Maui College) and the University of Hawai'i at Mānoa. The purpose of this agreement is to facilitate the transfer of students who complete the Associate of Science in Natural Science (AS-NS) degree with a Pre-Engineering Concentration at participating University of Hawai'i Community College campuses to the University of Hawai'i at Mānoa (UHM) College of Engineering. This agreement is intended to streamline the transfer process, increase the number of students in the Engineering program pipeline, and ease the transition for transfer students to support timely degree completion.

The Equity Gap

Table 1 below shows the total number of Natural Science (NSCI) majors and the number of Native Hawaiian NSCI majors for each year since Fall 2016.

Table 1. Number of NSCI majors, 2016-2020: total and by ethnicity



Data from table 1 shows that the number of Native Hawaiians in the NSCI program has dropped between 2016 and 2018, and that the trend has slightly reversed since: still, over the last three years, only 20% of the total number of NSCI majors were Native Hawaiians.

Table 2 below shows the total number of ASNS graduates as well as the number of Native Hawaiians who graduated with the ASNS.

Table 2. Number of ASNS graduates, 2016-2020: total and by ethnicity

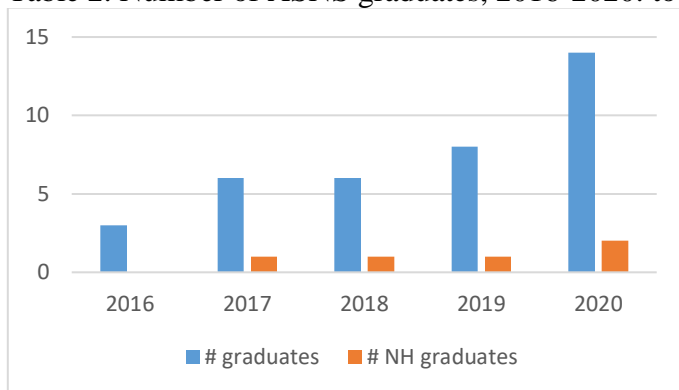
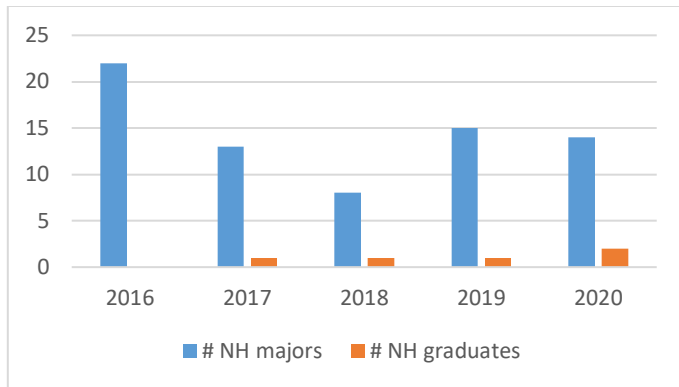


Table 2 shows that Native Hawaiians graduating with the ASNS are underrepresented: over the last three years, 14% of ASNS graduates were Native Hawaiians.

Table 3 below displays the number of Native Hawaiians enrolled in the NSCI program and the number of Native Hawaiians who graduate with the ASNS, from Fall 2016 to Fall 2020.

Table 3. Number of Native Hawaiians completing the ASNS degree



Data from table 3 show that only a small percentage of Native Hawaiians make it to the ASNS: they drop before graduating.

All three tables demonstrate that there has been and there is still, an equity gap that needs to be addressed. UHMC has been awarded numerous grants over the years to close the equity gap in STEM related fields due to ethnicity, the latest being two S-STEM grants: a \$1.6 million awarded in 2019 and another \$2.6 million awarded in 2021. Both grants (Project Kaihuwa'a I and Project Kaihuwa'a II) funded by the National Science Foundation, strive to increase the success of low-income academically talented students with demonstrated financial need pursuing STEM programs (ECET and NSCI) at UHMC. The grants provide annual scholarships up to \$10,000 to eligible ECET and NSCI majors, to include Native Hawaiians, as well as support from faculty mentors.

Three Native Hawaiian NSCI majors applied in 2020, and have been awarded the scholarship to be continued over the next three years. We hope that more NSCI students (low-income, Native Hawaiians) will apply, since the scholarships are a wonderful way to close the equity gap due to income and ethnicity.

2. Analysis of the Program/Unit

The overall Natural Science Program health, as indicated in the ARPD, is identified as Cautionary, same as last year.

Demand Indicator

The demand health is rated as healthy.

2021 UH Maui College ARPD
Program: Enter Program or Unit Name

#	Demand Indicators	2018-19	2019-20	2020-21	Demand Health
1.	Number of Majors	44	64	72	Healthy
1a.	Number of Majors Native Hawaiian	8	15	14	
1b.	Fall Full-Time	38%	54%	43%	
1c.	Fall Part-Time	62%	46%	57%	
1d.	Fall Part-Time who are Full-Time in System	7%	9%	14%	
1e.	Spring Full-Time	49%	42%	26%	
1f.	Spring Part-Time	51%	58%	74%	
1g.	Spring Part-Time who are Full-Time in System	9%	12%	25%	
2.*	Percent Change Majors from Prior Year	-11%	44%	13%	
3.	SSH Program Majors in Program Classes	150	237	134	
4.	SSH Non-Majors in Program Classes	851	587	582	
5.	SSH in All Program Classes	1,001	824	716	
6.	FTE Enrollment in Program Classes	33	27	24	
7.	Total Number of Classes Taught	32	22	16	

The demand health has seen a 13% increase in the number of NSCI majors from last year. This would seem counterintuitive considering the change in delivery modality due to the Covid-19 pandemic: all classes were offered online in Fall 2020, with only a few classes back to face-to-face in Spring 2021. There are also more part-time students in Fall 2020 and Spring 2021 than the previous year. It is likely that the online delivery method has attracted part-time students (increasing the total number of majors); those students who are working and unable to attend face-to-face classes. More students in the program but less full-time students explain in part the drop in the SSH for program majors in program classes (13% drop from last year) as well as the drop in the number of classes taught (27% drop from last year). The number of distance classes on the other hand more than doubled, from 6 in 2019 to 13 in 2020 (120% increase) as seen below.

#	Distance Indicators	2018-19	2019-20	2020-21	
21.	Number of Distance Education Classes Taught	5	6	13	
22.	Enrollments Distance Education Classes	115	135	295	
23.	Fill Rate	96%	92%	85%	
24.	Successful Completion (Equivalent C or Higher)	76%	83%	82%	
25.	Withdrawals (Grade = W)	6	6	19	
26.	Persistence (Fall to Spring Not Limited to Distance Education)	61%	58%	67%	

Efficiency Indicator

The efficiency indicator is rated as progressing.

2021 UH Maui College ARPD
Program: Enter Program or Unit Name

#	Efficiency Indicators	2018-19	2019-20	2020-21	Efficiency Health
8.	Average Class Size	14	17	21	Progressing
9.*	Fill Rate	66.5%	78.1%	83.3%	
10.	FTE BOR Appointed Faculty	2	2	2	
11.*	Majors to FTE BOR Appointed Faculty	22	31	35	
12.	Majors to Analytic FTE Faculty	14	31	71	
12a.	Analytic FTE Faculty	3	2	1	
13.	Overall Program Expenditures	\$1,000,062	\$830,018	\$802,423	
13a.	General Funded Budget Allocation	\$830,950	\$788,399	\$781,228	
13b.	Special/Federal Budget Allocation	0	0	0	
13c.	Tuition and Fees	\$169,112	\$41,619	\$21,195	
14.	Cost per SSH	\$999	\$1007	\$1121	
15.	Number of Low-Enrolled (<10) Classes	12	2	1	

The efficiency indicator went from healthy last year to progressing this time. This is quite surprising considering the positive results gained over last year: the average class size has increased by 23%, the class fill rate by 6.6%, the majors to FTE BOR faculty by 13%; and there is only one low-enrolled class out of 16. We believe that the underestimated number of FTE BOR appointed faculty, and the majors to analytic FTE faculty do not represent the reality and compromise the health indicator. It would help to identify which STEM courses qualify as part of the NSCI or part of the LBRT program.

Effectiveness Indicator

The effectiveness indicator is rated as progressing, same as last year.

#	Effectiveness Indicators	2018-19	2019-20	2020-21	Effectiveness Health
16.	Successful Completion (Equivalent C or Higher)	77%	78%	83%	Progressing
17.	Withdrawals (Grade = W)	35	33	21	
18.*	Persistence Fall to Spring	56%	69%	74%	
18a.	Persistence Fall to Fall	33%	45%	47%	
19.	Unduplicated Degrees/Certificates Awarded Prior Fiscal Year	6	7	14	
19a.	Associate Degrees Awarded	6	8	14	
19b.	Academic Subject Certificates Awarded	0	0	0	
19c.	Goal	0	0	0	
19d.	Difference Between Unduplicated Awarded and Goal	0	0	1	
20.	Transfers to UH 4-yr	12	7	14	
20a.	Transfers with degree from program	3	1	9	
20b.	Transfers without degree from program	9	6	5	
20c.	Increase by 3% Annual Transfers to UH 4-yr Goal				
20d.	Difference Between Transfers and Goal				

The year 2020 -2021 witnessed: a 7% increase in the Fall to Spring persistence rate; a substantial increase in the number of ASNS degrees (+75%) as well as transfers to UH 4-year institutions.

Conclusion

In terms of enrollment, persistence, graduation, and transfer to 4-year institutions, data from the last three years show positive outcomes and promising results for the future that are due to a combination of dedicated faculty and lecturers, committed counselors, and grants that support students enrolled in the NSCI program.

3. Program Student Learning Outcomes or Unit/Service Outcomes

a) Program Student Learning Outcomes

PLO1. Explain the natural and technological world using reflection and quantitative analysis including preparation of a plan to collect, process, and interpret data; evaluation of the plan, procedures, and findings; and communication of the conclusions;

PLO2. Explain scientific knowledge and understanding to different audiences for a range of purposes; and

PLO3. Apply scientific knowledge, skills, and understandings to problems and issues in daily life.

b) Program Outcomes that have been assessed in the year of this Annual Review.

SLO3 (Extract practical information from theoretical information, with emphasis on computational skill) was assessed in CHEM 162, General Chemistry II in Spring 2021. This class is a requirement for all four concentrations.

c) Assessment Results.

a. PLOs:

SLO3, linked to PLO1 and PLO3, was assessed in two assignments given to students enrolled in CHEM 162. The details of the assessments are provided at the end of this report.

b. CASLO

For CASLO assessment of Quantitative Reasoning (Standard 2) and Critical Thinking (Standard 5), the NSCI program investigated two assignments in CHEM 162, a course required for all NSCI program concentrations. The details of the assessments are provided at the end of this report.

Assessment 1 and 2 both completely satisfy the Standard 2 (Quantitative Reasoning) for the CASLOs. Similarly, both Assessments 1 and 2 satisfy Outcomes 5.1, 5.3, 5.5, and 5.6 of Standard 5 (Critical Thinking) for the CASLOs. These Outcomes link to SLO 3 by the fact that the students were able to apply quantitative information and reasoning to extract practical information from those data.

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

Results were satisfactory. No changes were made.

4. Action Plan

The NSCI program has shown a positive trend for the last three years. Our action plan for next year includes the following:

1. First action plan: work with counselors

Continue promoting the NSCI program and identify among LBRT students those who should declare NSCI as their major. This implies working closely with UHMC's counseling department. We are looking actively at hiring a part-time assistant to help the NSCI counselor using grant money.

2. Second action plan: ASNS classes

- Continue monitoring the offering of classes each semester to avoid scheduling conflicts.
- Consolidate working with the UH system to make sure classes that have been historically low-enrolled and subject to cancellation are offered on other campuses. The cross campus discussions in Fall 2020 have been instrumental in creating a sense of belonging across NSCI programs, leading to a better management of class offering and cost efficiency. Classes that are amenable to on-line delivery should be consolidated. Faculty should be assigned on a rotation basis to provide equitable opportunities for faculty to maintain proficiency. Other classes and labs should remain at individual campuses if there is community need. Following the summer 2020, all UHCC campuses share a common spreadsheet that lists courses required for the ASNS: each semester starting Fall 2021, each campus will update the spreadsheet with the courses offered and the delivery method.
- Continue offering SCI 295v, STEM Research Experience, each semester: it is a valuable hands-

on course where students apply what they learn, and a means to keep them in the program. This class is currently funded by a grant.

- Follow up on ASNS courses in Kualii: not all courses have been through the 5-year review.

3. Third action plan: website and catalog

Continue updating the NSCI website with relevant and current information, as it is a reference and a means to promote the program and recruit students.

4. Fourth action plan: recruitment and support for NSCI majors through grants

Continuing effort from UHMC faculty to promote projects that support NSCI majors, as a means to recruit students for the NSCI program, retain students in the NSCI program, and transfer students to 4-year institutions.

- Project Kaihuwa'a I and II grants: provide annual scholarships up to \$10,000 to low-income academically talented students with demonstrated financial need pursuing STEM degrees, i.e., ASNS and AS ECET at UHMC. Eight NSCI majors so far have been awarded the scholarships in 2019 and 2020: four have graduated with the ASNS and transferred to UH Mānoa (three) and UH Hilo (one). The scholarship is awarded to a student for up to four years, and follows the student after transferring to a 4-year UH institution.
- Pre-Engineering Education Collaborative phase II (PEEC II) grant: supports students planning to transfer to UH Mānoa School of Engineering. The grant provides funding to participate in the Mānoa Design Clinic (MDC) held at UH Mānoa in the summer: tuition for a math class and an engineering project class (ENGR 296), materials for projects, lodging, meals, and travel to Oahu.
- The IDeA Networks of Biomedical Research Excellence (INBRE) grant provides NSCI majors an opportunity to participate in a research project and apply what they learn.
- Bridge to the Baccalaureate (B2B) grant: provides stipends to Native Hawaiian and other underrepresented students transferring annually into baccalaureate STEM degree programs. Students participate in a research project or provide peer mentoring.
- The Hawaii Society of Professional Engineers (HSPE) Maui Chapter awards up to three scholarships of \$1,500 each annually to students entering an accredited college of engineering.

5. Resource Implications

We would like to request that the ICS position vacated in July 2021 be filled. This position is crucial to meeting the needs of students in the Information and Communication Technology concentration, as well as other STEM programs.

☐ I am NOT requesting additional resources for my program/unit.

Appendix: SLO3 assessment in CHEM 162