



Institutionalization of STEM degrees and Undergraduate Research through Faculty Professional Development

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ASNS: Two-year Degree in STEM

With the support of the I-Cubed grant, STEM faculty members consolidated and expanded the implementation of a two-year degree in STEM. The Associate of Science degree in Natural Science (ASNS) provides a clear, explicit, and coherent pathway to students intending to transfer into STEM majors at baccalaureate institutions. The ASNS has been the fastest growing degree in student enrollment at the College. As shown in Figure 1, Kapi'olani now has four tracks available to students and STEM faculty are still in the process of developing more pathways.

Associate of Science Degree in Natural Science (ASNS)

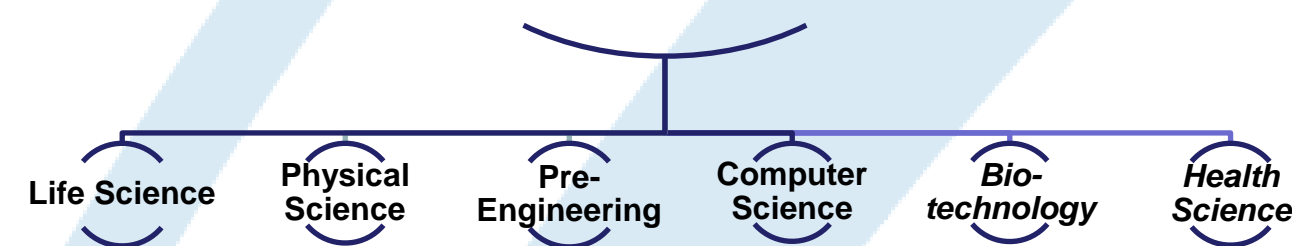


Figure 1: ASNS tracks implemented and in development

Expansion of ASNS Pathways and Enrollment

The Life Science (Biology, Marine Biology, Physiology, Pre-medical, Pre-Pharmacy) and Physical Science (Physics, Chemistry, Earth Sciences, Engineering) tracks were the two original ASNS pathways. As part of the PEEC effort, engaged faculty members who attended the I-Cubed Summer Institute developed the Pre-Engineering track to support STEM students interested in pursuing four-year degrees in Civil, Electrical and Mechanical engineering. In August 2012, an articulation agreement implemented between Kapi'olani and the College of Engineering of the University of Hawai'i at Mānoa allows for the automatic admission to the UHM College of Engineering for ASNS Pre-Engineering graduates. In 2013, these same engaged faculty members reached out to the Information Technology department on campus and collaborated with them to create the fourth track, Computer Science. This was the first time a bridge was forged between these two departments, allowing for expansion and institutionalization.

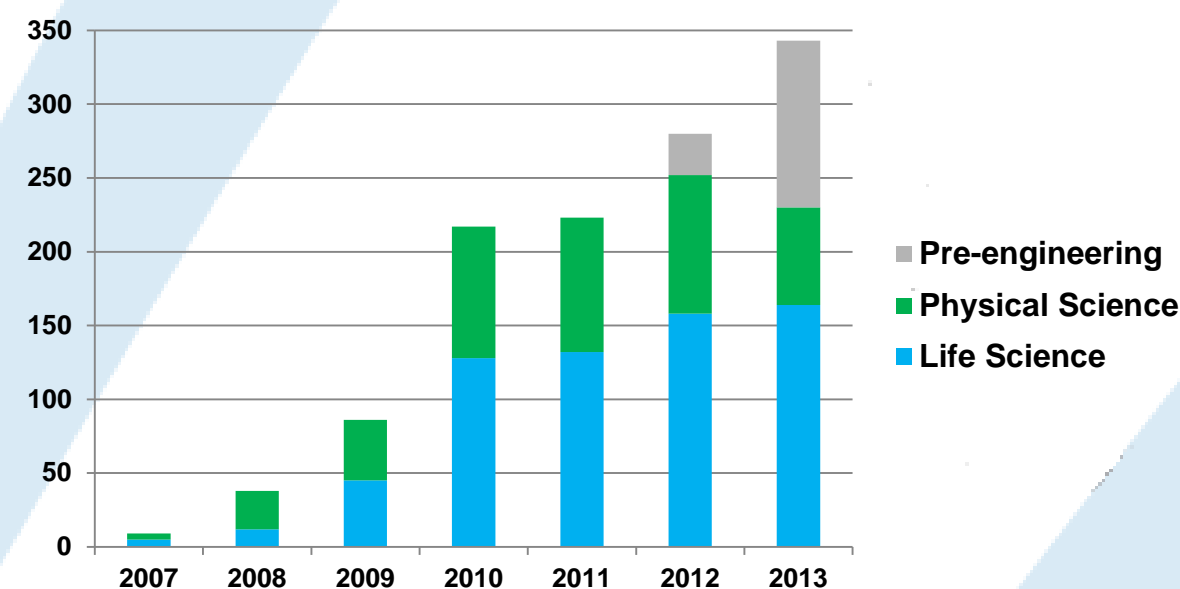


Figure 2: Students enrolled in the ASNS degree

Assessment of the ASNS Degree Program

Participants in the Summer Institutes led the way for the program assessment of the ASNS degree program. The steps involved included: assessing the program using the original program learning outcomes and revising the outcomes to better reflect the goals of the program. The ASNS program learning outcomes are now aligned with the STEM course learning outcomes as well as the department tactical plan, and the College's strategic plan. Assessment using the new outcomes begins in Summer 2014.



Figure 3: Alignment strategy of Learning Outcomes

13 GOALS

Kapi'olani Community College's I-Cubed goals are:

- Goal 1. Institutionalize, improve and sustain a formal STEM enterprise;
- Goal 2. Increase the number of STEM faculty engaged in producing STEM degree completers from 6 to 26 thus improving gatekeeper course student success rates.

FIRE-UP Summer Institute, 2009-2013

One week intensive workshop for STEM faculty members during non-instructional week in May. The focus was on incorporating best practices in teaching, building collaborative relationships amongst STEM faculty members, and building the STEM program capacity.

Goal of the Institute:

Broaden capacity of faculty members to be engaged in the STEM Program

Participants over the 5-year period:

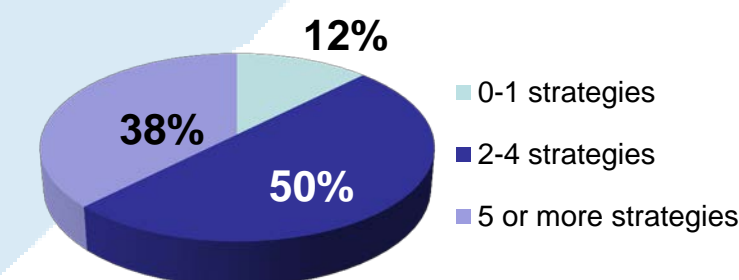
28 faculty members (19 full-time and 9 lecturers) from the following disciplines: Biology, Chemistry, Engineering, Mathematics, Microbiology, Physics, Zoology.

Key Outcomes of Summer Institute and Its Participants:

- Participants in the Summer Institute drove the development of the two newest ASNS degree tracks: Pre-Engineering and Computer Science, and started the implementation of the program's assessment.
- These engaged STEM faculty members reached out to and collaborated with a different academic department to develop the Computer Science track, creating the first bridge between these two departments and further institutionalizing the STEM program.
- 14 faculty members have stepped up to mentor students in Undergraduate Research (UR). 12 of the 14 mentors (86%) were Summer Institute participants.
- 100% of STEM faculty members who spearheaded the institutionalization of UR participated in the Summer Institute.
- 74% of participants teach STEM gatekeeper courses.
- 94% of participants incorporated at least one best practice presented at the Summer Institute in the years following their participation in the Institute. Mean: 3.8 best practices adopted per participant.



Figure 4: Implementation of Best Practice Strategies presented at Summer Institute



Student Success in URE

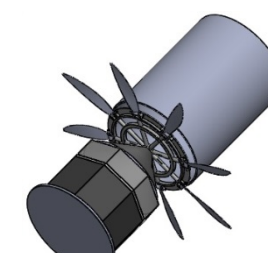
Conferences	Awards
SACNAS 2012	1 outstanding research in Biology 1 outstanding research in Molecular Biology
SACNAS 2013	1 outstanding research in Biology
International Cansat Competition 2013	1st place
JABSOM Biomedical Symposium 2013	Best Undergraduate Presentation
University of Hawaii Undergraduate Research Opportunities Program 2013	1st place in the Undergraduate Division
ERN 2014	1st place in Ecology, Env. and Earth Sciences 1st place in Soc., Beh. and Economic Sciences



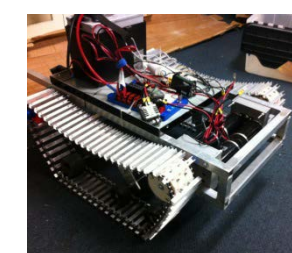
Underwater Robot



Pupillometry



Cansat 2014



MarsBotics

Institutionalization of Undergraduate Research

Undergraduate Research (UR) has been implemented with the support of I-Cubed, STEP, TCUP and PEEC, resulting in outstanding student success at the national level. Of special significance for sustaining UR beyond grant funding was the team of engaged faculty members from KapCC that attended the Community College Undergraduate Research Initiative (CCURI) workshop in April 2012. With the continuous support of the Vice Chancellor of Academic Affairs, the team devised a plan to institutionalize undergraduate research at KapCC, created clear Hallmarks, and has implemented the model in STEM courses. In this new model, UR is:

- Formally embedded in the ASNS program (as shown in Figure 4)
- Student-Centered
- Project-Based
- Grounded in the Scientific Method / Problem-Based (Engineering)

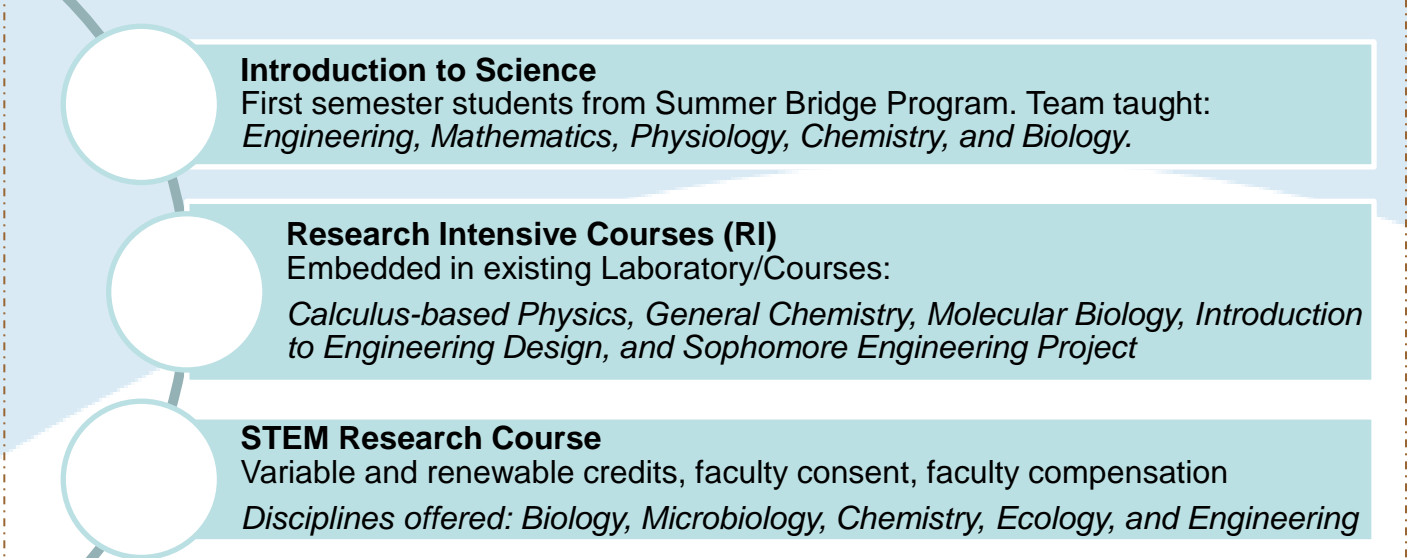


Figure 5: Structure of Undergraduate Research in the STEM program

Research Model



Figure 6: Research Model implemented in STEM undergraduate Research courses

College-Wide Institutionalization of Undergraduate Research

