Division/Unit/Area Name: Mathematics and Natural Sciences

Summary of progress made during past year towards achieving program goals and college goals

- For divisions, this section will be used to indicate progress toward AA Degree goals as well as other program goals within a division and college goals.
- Discuss how well previous year’s plans were implemented and the subsequent results of the implementation.

The Math and Natural Sciences Division offers courses from 18 disciplines: Astronomy, Biochemistry, Biology, Botany, Chemistry, Engineering (CE, EE, ME), Food Science & Human Nutrition, Geology & Geophysics, Health, Horticulture, Information & Computer Sciences, Mathematics, Oceanography, Pharmacology, Physics, Quantitative Methods, Science, and Zoology. The courses offered by the Division include general education core requirements in Foundation Symbolic Reasoning (FS) and Diversification Biological (DB), Diversification Biological + Lab (DB + DY), Diversification Physical (DP), Diversification Physical (DP + DY), Diversification Laboratory (DY), and Diversification Other (DO) for the AA and AS degrees. The courses offered in the Division are to provide for the rationale for the general education requirements of the college, which are to “provide students the opportunity to develop understandings, abilities, values, and attributes which enable them to apply their knowledge, skills, and talents to make judicious decisions and to analyze and solve human problems within a multi-cultural community”.

The Division offers many of the General Education Core requirements of the AA and the AS NS degrees. The Division’s course offerings include 10 of the 11 courses for the Foundation Requirement for Symbolic Reasoning (FS), 2 ICS courses that are used for Diversification Humanities (DH), 13 of the 14 courses for Diversification Biological (DB), all 9 courses for Diversification Biological + Lab (DB + DY), 11 of the 12 courses for Diversification Physical (DP), all 9 courses for Diversification Physical + Lab (DP + DY), 15 of the 17 courses for Diversification Laboratory (DY) and all 5 ICS courses for Diversification Other (DO). Among the most commonly taken courses with enrolments of over 200 per year are ASTRO 110, BIOC 241, BIOL 100, BIOL 130, ICS 100, Math 100, Math 135, OCN 201, and PHRM 203. Courses with more than 500 students include Math 18 (1,071 students), Math 82 (1,439 students), Math 103 (861 students) and MICRO 130 (505 students).

The Math and Sciences Division has been offering Distance Education (DE) classes using various media and methods of communication to provide the opportunity to take the courses without having to come to campus. The DE format helps to address the College Goal of increase the number of graduates and transfers in all areas by 25% by offering science classes via the web or cable technology and less the need to be on campus. Related to college’s goals of offering the DE classes assists in eliminating gatekeeper courses, promoting native Hawaiians success through non-traditional methods of learning, and increasing the number of
students enrolled in degrees and certificate programs by giving the students increased access to distance educational opportunities and more allowing access to cost effective e-books. There are at least 16 courses in the Division that are offered through DE. These courses include BIOC 241, BIOL 100, BIOL 101, BIOL 130, HLTH 110, HLTH 120, HLTH 125, ICS 100, ICS 101, ICS 125, ICS 170, ICS 211, ICS 241, ICS 242, MICRO 130, PHARM 203 and ZOOL 240. One of the Zoology faculty has developed several virtual labs used in the anatomy and physiology lab.

The Math and Natural Sciences Division offer the following Degree Programs and Certificates: 1). AS in Information & Computer Sciences (ICS), Certificate of Achievement (ICS), and Certificate of Completion (ICS) 2). AS in Natural Sciences (ASNS) in three Pathways: ASNS in Life Sciences, ASNS in Physical Sciences, and ASNS in Engineering. A fourth pathway is planned for ASNS in Information and Computer Sciences. 3). AS in Plant Biology and Tropical Agriculture (PBT), Certificate of Achievement (PBT) and Certificate of Completion (PBT).

The M&S Division has three Programs: 1). Information & Computer Science, 2). Natural Science and 3). Remedial/Developmental Math. The Annual Report of Program Data Analysis (ARPD) that can be accessed through the UH System website at the following website: http://www.hawaii.edu/offices/cc/arpd/index.php. The Information & Computer Science Program offers Certificates of Competence in 12 areas of specialty, an Academic Subject Certificate in Information & Computer Science, and an AS in Information & Computer Science in five areas of specialty with emphasis on Network Support, Database Support, Information Security, Mobile Developer, and Software Developer. The Natural Science Program offers pathways for STEM (Science, Technology, Engineering, and Science) and AS in Natural Sciences in pathways of Life Sciences, Physical Sciences and Engineering. A fourth pathway will be Information and Computer Sciences. The program is designed to fulfill the first two-year requirements for baccalaureate degrees in the sciences. The Remedial/Developmental Math Program does not offer any degree, but a number of the courses that are used in degree programs use remedial/developmental math courses as prerequisites.

The Information & Computer Science (ICS) Program offers the AS in ICS degree, which is designed to prepare individuals for employment as technical assistants to professional and administrative personnel using computers. There are five areas of specialty: Network Support Specialist, Database Support Specialist, Information Security Specialist, Mobile Developer Specialist and Software Developer Specialist. The program’s Counselor, Amy Amper, and ICS Retention Specialist, Kristen Mullen, help with the completion, retention and transfer of students within the program. The Overall Program Health is Healthy with the Healthy ratings for Demand and Efficiency Indicators. The Effectiveness Indicators are Cautionary.

Last year, the ICS Program was brand new and was well received by the students, several of which voluntarily switched to the new program. The new requirements required a massive amount of course substitutions, but with everyone’s willingness to help, the process was expedited and successful. Students switched to the new program, which provided college credit and the option to get industry certified. To better teach these courses, some of the ICS faculty members have obtained their industry certifications; Petersen Gross and William Albritton have their Security+ certification, while Alex Ramos obtained his A+ certification. Aside from these certifications Michael Bauer got Oracle certified and this includes oracle databases and Java. Industry certifications are required or are part of the desirable qualifications in many advertised jobs.
An important goal for the ICS faculty last year was to better market the program. Kathleen Cabral had proposed to create student success videos to help promote our program. The ICS faculty began the process but somehow it fell through the cracks. However this year the media center and Leanne Riseley have proposed that the faculty do something similar. The faculty will begin video recordings to introduce themselves and to talk about the courses they offer. These videos will be public and posted in YouTube. The faculty plan to make these videos part of their marketing efforts. Another goal was to promote the ICS program by inviting guest speakers to talk about computer security. Mr. Pete Gross made this possible. In September of 2013 Inez Miyamoto from the FBI came to Leeward to talk with the ICS students about security threats as well as the FBI’s need for more security professionals to keep the public safe. The ICS faculty will continue to plan talks like this to retain and recruit more students into the program. The faculty had planned to visit area high schools to promote our program, but have not been able to do this yet. However, they have offset this by increasing ICS faculty participation in the new student orientation (NSO). In addition, to help promote the ICS program, four sets of programmable legos mindstorms were purchased to be used in recruiting events. These legos also used in the ICS110- Introduction to Programming class as part of the curriculum.

The Natural Science Program helps to address the need of the 2008-2015 and 2015-2020 UHCC Strategic Plan, Goal C: Promote Workforce and Economic Development, with a special emphasis on STEM programs and by increasing the number of STEM degrees earned. A degree in STEM fields addresses “the critical workforce shortages and prepares students (undergraduate, graduate, and professional) for effective engagement and leadership in a global environment.” This program centers about the Associate of Science Natural Science Degree (AS NS) which first started at our college in AY 2012-2013. Since the program just completed one year, the Overall program Health is yet to be Determined. The Effectiveness Indicators had the Persistence (Fall to Spring) at 78.9%. A major effort was to justify and hire a STEM counselor dedicated to promote STEM related fields and support STEM students. Major efforts were been planned to get students to identify themselves as STEM majors. A STEM counselor was hired in Fall 2013. There were 8 students who graduated with the AS NS degree in May 2013.

Last year, the program experienced immediate demand and substantial growth in its first year. There were 122 students who changed their major to the new AS NS Program. With recruitment of incoming and continuing students, that number has doubled in the current semester to 231. The demand for the program continues to be strong and it should continue to grow in subsequent years. There are 29 Native Hawaiians represent 24% of the 122 students. Efforts to recruit and retain Native Hawaiian students are ongoing. The Math and Sciences Division offering of Distance Education courses provides greater access to the AS NS program for all students, especially the returning students, those with jobs or families, and to those who cannot come to campus for particular courses.

The Remedial/Developmental Math Program offers math courses that are designed to improve students’ study skills and to provide the rigorous background for success in subsequent college level math courses. The Headcount census enrollment in AY 2013 was 15,177 while the unduplicated number of students enrolled in any remedial/development math course increased 8% in the year. The Overall Program Health is Cautionary.

Last year, the program changes would be far less likely to happen without an active and motivated Developmental Math Coordinator who works with faculty, staff, administrators, and
students to continually provide the momentum to drive promising initiatives. Continued existence and funding of the position is crucial to ensure that the program does not revert to prior practices. The Developmental Math Coordinator also handled routine data gathering and reporting on internal and external funding.

Upgrade of testing computers and network in Math Testing Center: In spring 2013, IT installed temporary network lines with used switches to improve connectivity until a permanent solution is implemented. However, upgrading the 8-year-old hand-me-down computers has not been funded and is included in this year’s action plan.

Math Learning Center hours: The Math Lab extended its hours of operation slightly in spring 2013 to include Sundays from noon to 4:00 pm. Additional student assistants and casual hires to extend the Math Lab’s evening and/or weekend hours may possibly be needed for future semesters to support the Emporium redesigned courses.

Math Lab Manager position: The Math Lab manager’s duties were reviewed and revised based on the Math Lab’s current functions. A new Math Lab manager was recruited at PBA in summer 2013. Upgrading the Math Lab Manager’s position to possibly PBB is deferred for now.

Reserved seats for new students and for students completing developmental math courses early: To increase the percentage of the AtD cohort enrolling in remedial/developmental math and the persistence rate, eight sections (15 seats each) of MATH 18, five sections (15 seats each) of MATH 82, and three sections (30 seats each) of MATH 103 were hidden in Banner for the fall 2013 registration period and reserved for new students and continuing students who completed MATH 9, 18, or 82 early in the semester.

Support for the Developmental Math Counselor: Although reserved seating was implemented for the fall 2013 registration period, the Developmental Math Counselor cannot accommodate the added time commitment needed to counsel all students who want to take advantage of this registration option. A casual hire, or additional counselor to work with math students at all levels, is still needed for proper implementation of reserved seating and is included in this year’s action plan.

**Assessment progress for past year**

- Attach report of program and course assessments from Tk20 for the 2012-2013 academic year.
- This report will include completed assessments as well as analysis of results and future plans.

According to the *Leeward Planning: Course Outcome Status Longitudinal Report by Divisions* report, the Math and Sciences Division has assessed 68 of the 126 courses or 54.0%. Note that some of the courses are slated to be deleted and may not have been approved as “Deleted Course” at the time this report was written. If we remove the deleted courses from our Division’s courses, our assessment rate would be higher. Various reasons contribute to the non-assessment of courses of certain courses. The two division’s representatives to the College’s Assessment Committee, Catherine Walker and Andrea Wichman are working with the faculty to complete the assessments, especially on those courses with no input in Tk-20.
The Division had 27 Gate Keeper Courses in the AY 2012-2013 with success rates lower than 70%. These included AG 112, ASTR 110, BIOC 241, BIOL 124, 130, 130L, 171, 172, 172L, EE 150, FSHN 100, 185, GG 101, ICS 111, 251, Math 9, 16, 50C, 82, 100, 103, 135, 140, 140X, PBT 100, PHYS 170, and SCI 103. The results and analyses of the course assessments should be able to assist in the faculty efforts to increase the retention rate to 70% or above. Increased efforts to get all faculty involved will be top priority in the present academic year and the next year. Tk-20 for that faculty who has very little experience with the process is being scheduled.

The faculty responsible for the following gatekeeper courses with success rates under 70% has been working to improve the course completion rates. Developmental/Remedial Coordinator, Jenny Watada has been working with the Math 9, Math 16, Math 18 and Math 82 faculty to institute changes to the courses to improve retention rate. In addition to course content and course procedure changes, there have been changes to Math Lab and the Math Test Center procedures to better help the students. The number of Lecturers teaching the courses is 56% of the Developmental/Remedial Fulltime faculty. The fulltime instructor will be able to help with curriculum development and suggest course improvements.

Math Coordinator, Eric Matsuoka, and Lead Math 103 faculty, Donnabelle Pascual, has been meeting with the gatekeeper course Math 103 instructors to improve the retention rate of this course. Changes in homework assignments, paper quizzes and exams have been made to better meet the SLOs of the course and students. Also, testing procedures and Math Testing Center improvements are part of the interventions for improvement of retention measures.

Biology Instructor, Rhea Hautea had a mini-grant from the Success Committee to purchase iPads to deliver the course materials for BIOL 130 and BIOL 130L to the students. She has been modifying her lectures and activities to reach out to the students.

Description of current issues, problems, and opportunities

- Describe issues, problems, and opportunities to which the division/unit/area intends to respond. Specifically discuss those related to strategic plans and campus/system-wide initiatives.
- This section can also include a discussion of modified or new goals to be addressed, based on analysis of ARPD

Information and Computer Science Program: The current issues, problems, and opportunities are as follows: 1). Distance Education: The steady expansion of the ICS program to reach more and more students is evident by the number of distance education courses offered every semester. The number of courses has remained at an average of 15.6 with a fill rate that averages 97.7% during the last 3 years. In an effort to attract and retain more students as well as to help those that cannot physically attend school due to scheduling issues, we are trying to offer both face-to-face and online versions of most of our courses to accommodate our students. Our faculty takes full advantage of the services offered by the educational media center and cable TV broadcasting to better serve our students. 2). Hybrid Classes. The faculty is currently pursuing more hybrid classes to reduce the time that students need to be on
campus and therefore making taking ICS classes more convenient. Most of the ICS hybrid offerings flip the classroom, which has students study material at home then when they come to campus they ask questions and engage in activities that promote learning. For example, Alex Ramos is offering a hybrid version of ICS125, the course that trains students to become A+ certified. This course in particular is a hard one to offer online because it involves a large amount of hands-on activities. However and due to student demand he is now offering a hybrid version of this course, where students learn the theory on their own and meet at Leeward to practice. 3). Reaching out to High School Students. There is a need to attract high school students to the ICS program. With the help of the ICS Counselor and ICS Retention Specialists, there needs to be more contact and collaboration with the area high schools to inform them of the ICS program and to get students interested in the ICS program. There should be a demand for the ICS program as well as higher completion rates for classes as a direct result of the marketing efforts of the ICS faculty, counselor and retention specialist. 4). System wide ICS Committee consisting of one faculty from each college: There is a need to for Program Campus Council meetings for articulation improve the chances for students to succeed because they can transfer work from one campus to another. We hosted a meeting in 2011 and we attended another PCC meeting in October 2013 at Kapiolani Community College. All community colleges are now working together for further articulation, which may include the change of program alphas to facilitate course identification and transfer.

Natural Sciences Program and the AS NS degree: The program is trying to use its AN NS Program Coordinator, STEM Counselor and the M&S Division faculty to promote the program and recruit STEM students. The goal is to have students declare themselves as STEM or AS NS majors. The AS NS degree helps to address the need of the 2008-2015 and 2015-2020 UHCC Strategic Plan, Goal C: Promote Workforce and Economic Development, with a special emphasis on STEM programs and by increasing the number of STEM degrees earned. A degree in STEM fields addresses “the critical workforce shortages and prepares students (undergraduate, graduate, and professional) for effective engagement and leadership in a global environment.” The needs of the program include having upgraded lab and other facilities for math and science courses, increased tutoring and peer mentor support services, increased staffing in high demand math and sciences courses, and support for maintaining and developing connections with the community.

Remedial/Developmental Math Program: For the Remedial/Developmental Math ARDP, the Developmental Math Coordinator is instrumental in carrying out the projects and to initiate any new initiatives. The Math Testing Center has many hand-me-down computers from the LRC and most computers need to be replaced due to incompatibility of programs or are no longer suitable for repair. Math Lab budget is under funded since the G-funded allocations have not been adjusted for annual increase of student wages and the use of student helpers in the Math Test Center.

Mathematics Discipline: 1). In direct support of the AAS degree programs in Culinary Arts and Automotive Mechanics Technology, Jennie Thompson and Eric Matsuoka led a multi-campus, multi-discipline team in designing two courses, MATH 100C (Survey of Math for Culinary Arts) and QM 107C (Quantitative Methods for Automotive Technology) that meet program, college, and accreditation expectations. Preparations were initiated during the American Mathematical Association of Two-Year
Colleges Annual Conference held in Jacksonville, Florida in November 2012. There were sessions on contextualizing mathematics content to be meaningful to students in CTE programs and in-depth discussions of design and implementation of contextualized courses in the Math for AAS Programs subcommittee. These sessions guided the overarching philosophies and goals of this project.

2). In direct support of the ASNS degree program requirements, Jiajia Seffrood developed a MATH 231 (Calculus III) course to be offered as a WWW distance learning course in spring 2013 for fall 2013 delivery. The MATH 206 (Calculus II) web course developed jointly by Eric Matsuoka and Windward CC’s Jean Okumura was offered by Eric Matsuoka for the first time in spring 2013. Of the 23 students enrolled in the course at the end of the add, 19 (83%) earned a C or better. Discussions with the University Academic Affairs office for Leeward CC development of MATH 232 (Calculus IV) are ongoing.

3). MATH 103 is a significant course to the ASNS program due to its use both to build a sound foundation for subsequent mathematics courses and as a prerequisite to CHEM 161B, a specific degree requirement. MATH 103 underwent several revisions since 2009 course assessment results indicated that the vast majority of students were not proficient in the assessed course learning outcomes. After a change in textbook produced marginal results, the math discipline overhauled course requirements and redesigned the delivery of MATH 103. The Emporium model was fully implemented for MATH 103 in fall 2012. While success rates were somewhat disappointing (38% in fall 2012 and 42% in spring 2013), the students who passed unequivocally demonstrated proficiency in each of the course learning outcomes. To study whether students might learn better using the traditional delivery format while keeping the overhauled requirements, some MATH 103 sections in AY 2013-2014 will be offered as lecture classes but with grading requirements comparable to those adopted for the Emporium redesign.

4). Another crucial component of the Emporium redesigned MATH 103 sections is the presence of in-class student tutors who work with the instructor to assist students during their scheduled class times. With an in-class tutor, the student to tutor/instructor ratio is 15:1, which is squarely in the interval recommended by the National Center for Academic Transformation. The estimated cost of an in-class tutor for each Emporium redesigned section of MATH 103 is $10,000 per academic year. This cost was previously paid by a Student Success Committee grant but a G funded allocation would ensure that students continue to receive high-quality assistance in their redesigned classes.

5). All sections of MATH 18, 82, and 103 and the previously described MATH 206 and 231 distance courses use Math Testing Center facilities to proctor quizzes and exams and provide re-take opportunities. Some sections of on-campus STEM track calculus courses also use the Math Test Center to allow for repeatable exams. This provides students with multiple opportunities to demonstrate proficiency in the course learning outcomes and improves their chances of passing the courses. This is one of the critical recommended provisions to move courses off of the “gatekeeper” list. Calculator and other testing restrictions are implemented in some cases to ensure exam integrity. Familiarity with these expectations is crucial to ensure testing integrity while making the re-testing opportunity to students.

Earth Sciences (Astronomy, Geology, and Oceanography) Discipline: Earth Science discipline includes astronomy, geology, and oceanography fields. Several classes are offered each semester in all the above fields. Furthermore geology and oceanography offers accompanying labs to meet the physical science lab requirements. In Astronomy, more than 65 percent of the students participate in observatory activities, and student assessment indicates that greater successes rate among students
who participated in hands on activities. Leeward Community College astronomical observatory, also known as “KiloHoku” in Hawaiian, is a modernized and highly equipped lab facility of one of its kind in the UH System, dedicated to serving the educational needs of the LCC students, faculty & staff, and the community at large. Educational activities include simple observation of the night sky for the interested viewers, identify and in-cooperate name of Hawaiian stars and relate it to Hawaiian culture and ocean navigation, hands on detailed study of the celestial mechanics for students enrolled in astronomy classes, direct experience of viewing distant planets, stars, and galaxies, and astronomical research activities for students and faculties. In the past, collaborating and conducting research programs with other well-established institutions such as MIT, Williams College, and California Polytechnic State University has resulted in publication of scientific works in Science and Journal of Double Star Observations. Currently KiloHoku staff has expanded the undergraduate research program to the local high school students giving them an opportunity to solidify their science curriculum and get a head start on scientific research and methods as they enter college for higher education. Moreover, "KiloHoku" observatory has provided numerous community observing events to fuel the imaginations of kids, adults and the elderly alike in space science. The telescopes and facility works very well, however it also requires immediate maintenance to keep up and tune up the aging facility [lack of maintenance in the very near future could result in complete loss of this facility]. The following a list of items needed at the observatory for its proper function and usage.

**Plans for next year to respond to current situation and meet goals from CRE**

- Describe how the division/unit/area intends to respond to the ARPD analysis and the issues, problems, and opportunities identified above.
- Specific actions need to be identified and described with target dates and person responsible for ensuring the action is completed.
- Each action needs to describe how the division/unit/area will know if the action(s) planned is/are effective.

Information and Computer Science Program: The action plan is as follows: 1). Distance Education: In an effort to attract and retain more students as well as to help those that cannot physically attend school due to scheduling issues, we are trying to offer both face-to-face and online versions of most of our courses to accommodate our students. Our faculty takes full advantage of the services offered by the educational media center and cable TV broadcasting to better serve our students. The ICS dept counted with the following Cable TV courses: ICS141 re-taping in progress (Bauer), ICS241 currently being offered (Bauer), ICS111 currently being offered (Polo), ICS211 currently being offered (Albritton), and ICS184 re-taping in progress (Polo). The faculty is still recording new material. This is the first semester that our new addition, ICS171 (Intro to computer security) is being broadcasted, featuring Mr. Vince Lee. While as this report is being written, ICS184 with Blanca Polo is being revamped and recorded to match our new program curriculum. In the near future the faculty have plans to record and broadcast ICS 283 (CCNA), featuring Mr. Petersen Gross and ICS212 (Program Structure) featuring Dr. Blanca Polo. We are also contemplating the possibility of recording ICS270 featuring Mr. Mike Bauer and ICS 113 featuring Mr. Petersen Gross. 2). Hybrid Classes—Dual
Format. The ICS faculty is offering classes with dual format. Blanca Polo is currently testing this. Classes are offered in the classroom and are recorded for students that cannot attend class so that they can view the lecture at their convenience. This allows students to pick the delivery format that better suits them. Some of them attend class in person; some others attend class online while others just watch the recorded lecture at their convenience. One great feature about the implementation of this process is that it only requires the use of the Blackboard Collaborative software provided by the media center. This system is proven to be a success even among students that come to class but want to watch the lecture again. This delivery method is well-suited for computer science courses that change more rapidly than the average ones such as mobile device programming which features operating systems that change two or three times per year.

3). Reaching out to High School Students. The faculty is currently working with Leilehua HS to bring a set of high school students to take our ICS101 class during the Fall 2014. Preparations for this are underway and we hope to keep some of them as ICS majors. This shows that high schools see the potential of computer science education for their students. Leilehua students are part of a high school program entitled iReady. Students and their chaperons are visiting Leeward Community College on Nov 5th 2013.

4). System wide ICS Committee consisting of one faculty from each college: Collaborate with the other colleges to keep the PCC meetings to discuss articulation and other important issues that affect each college. Get administrators from each college to assist in setting up these meetings to discuss system ICS issues affecting all colleges. Schedule these meetings at least once or twice a year.

5). Impact of membership in the UH Cyber security Education Group.

Within the state the ICS program at Leeward Community College is part of the Cyber security Education Group (our representatives, Vince Lee and Blanca Polo). This group meets at UH Manoa at least once every semester and it includes not just the community colleges but also the 4-yr institutions.

The UH Cyber security Education Group has several goals in mind, all of them which may help boost enrollment and employment of our students enrolled in the networking and security specialization. Goals are articulating industry/DoD needs for graduates with cyber security and/or information assurance education/experience, discussions about the future of Centers of Academic Excellence (CAE) across UH, and begin UH curriculum student learning objectives and gap analyses that occur when mapping against industry requirements. The advantage with partnering with this group will be increased publicity of our ICS program, higher demand from students for our program as well as an increase in completion rates as a direct result of the marketing strategies for the ICS program and the efforts of the and ICS faculty.

Natural Sciences Program: Natural Sciences Program has a goal of having as many students declare themselves as STEM majors. The activities planned are designed to increase enrollment, retention, and successful transfer to a baccalaureate program. This involves continuing efforts with the help of the STEM Counselor to increase efforts of recruitment at the college and at high schools, enhance counseling support, and the creation of a AS NS newsletter to keep students informed of the AS NS and STEM related activities. Efforts by the STEM Counselor and STEM faculty will continue to collaborate with UH Manoa’s CTAHR to develop an appropriate two-year pathways for the four AS NS pathways. Also, there will be collaborative efforts with our college’s Hawaiian Studies faculty to integrate place-based research in the science curriculum, including a planned outing to Kahoolawe, continued local service activities to natural and cultural resource sites, and increased collaboration between the Halau’s student services staff and the faculty of the AS NS Program. The resource implications include facilities upgrade of biology, physics, engineering, chemistry, and math labs. Increased tutoring opportunities and peer mentoring programs to support classroom learning, retaining
positions of retiring faculty, increased offering and staff for high demand courses, and support for maintaining and developing connections with the local community in STEM interests.

Remedial/Developmental Math Program: The action plan is as follows: 1). Numerous new and ongoing initiatives require a Coordinator to oversee the remedial/developmental mathematics program. For the level of collaboration among faculty, staff and administrators, the coordinator is essential in supervising and coordination of the math program. Release time for the Coordinator needs to be 3 credits per semester or 6 credits per year. 2). Conversion of a Lecturer position into a full-time Math Instructor position. This period recorded an 8% increase in the number of students enrolling in remedial/developmental classes and non-Regular Discipline Faculty teaches 56% of the classes. A full-time Math instructor will be able to assist in math course and program development and continue to uphold the integrity of the Emporium redesigned classes. 3). Support for the Developmental Math Counselor: In addition to the number of students requiring counseling after completing a remedial/developmental math course (statistics shown below) and the standard counseling duties, the Developmental Math Counselor undertakes the implementation of reserved seating or priority registration for newly accepted students and continuing students who complete a remedial/developmental math course early in the semester. If more students seek priority registration, she may not be able to accommodate all of them. A casual hire, or additional counselor to work with math students at all levels, is needed for proper implementation of reserved seating.

- Fall 2012: 265 students
- Spring 2013: 192 students
- Mid-semester, Fall 2013: 130 students

4). Upgrade of testing computers and network in Math Testing Center: The Math Testing Center was repurposed and equipped with no dedicated G or special funds. The computers in use are hand-me-downs from the Learning Resource Center. These eight-year-old computers are barely fit for current use and would not be suitable for repair. They will need to be replaced. IT installed temporary network lines with used switches to improve connectivity until a permanent solution is implemented. Installing permanent network lines and new switches will improve the reliability of the testing services. 5). Math Learning Center usage and hours: The Math Lab is currently underfunded. The amount of G-funds allocated to the Math Lab has not been adjusted for many years even though student helps wages have increased. Due to budget constraints, the Math Lab had to restrict services in summer and fall 2013 and reduced the number of student assistant tutors on duty. Consequently, tutors were not readily available to students who needed help. More G-funds must be allocated to the Math Lab to help promote retention and student success in math courses. 6). Math Testing Center usage and hours: Because the Campus Test Center was overwhelmed in fall 2011 and spring 2012 by students from the redesigned math classes, the Math Lab provided testing services for all redesigned math courses. The “soft money” funding Math Testing Center student assistants needs to be replaced by G-funds. The numbers of students taking proctored paper-and-pencil quizzes and exams in the Math Testing Center show that this service must be maintained:

- Fall 2012: 10,059
- Spring 2013: 10,479
- Mid-semester, Fall 2013: 6,121

7). Upgrade of testing center facilities: No G or special funds were allocated to furnish the Math Testing Center. The furniture now in use is a hand-me-down. Not only is there not enough seating, but also the furniture cannot be reconfigured in ways that would accommodate the various functions of the center: computer and paper testing, study, tutoring, small group work, and testing. Replacing the furniture will allow us to optimize seating capacity and allow students to take better advantage of the repeatable low-stakes testing, which is an important characteristic of the Emporium model. 8). Upgrade work stations in the Math Emporium...
classroom: To promote good study skills, which in turn increase success rates, students must be able to take notes from the math computer software and collaborate with each other. Current workstations do not provide enough space for students to take notes and do other work. Larger stations are needed.

Mathematics (College Level) Discipline: Funding for analogous professional development activities is needed to ensure that new or redesigned curriculum aligns with national expectations. Estimated annual budget: 4 conference attendees @ $2,500 (airfare, transfer, lodging, per diem, conference registration) = $10,000

These calculus distance courses are significant since they provide flexibility for students wanting to meet ASNS course prerequisites or program requirements. Funding for the development of MATH 206 and 231 was split between Leeward CC (stipend/overload for the faculty member “subject matter expert”) and the UH Academic Affairs office (production costs) so if an agreement to develop MATH 232 is reached, Leeward CC may need to cover the cost of the subject matter expert. Estimated budget: 3 credits @ $2044/cr (C5) = $6132.

To support the students in the transfer math sequence (most of which are requirements in some form or other for the ASNS degree), the Math Lab and Math Testing Center require additional funding. The division appropriation has not been increased in several years even as student assistant pay rates have increased, the Testing Center opened, and the Math Lab experienced substantially increased demand for tutoring.

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The Math Lab's annual appropriation is currently $25,000 from the Math & Sciences Division. This appropriation is currently supplemented by a recurring $20,250 grant from the Student Success Committee but directly allocating G funds would ensure continuation of reasonably efficient tutoring functions and continued assurance of exam integrity. Accounting for near-term increases in student assistant pay rates, the estimated combined Math Lab and Math Testing Center student assistant budget is $61,000, an increase of $15,750 over the current combined Division and Success Committee allocations.

Another crucial component of the Emporium redesigned MATH 103 sections is the presence of in-class student tutors who work with the instructor to assist students during their scheduled class times. With an in-class tutor, the student to tutor/instructor ratio is 15:1, which is squarely in the interval recommended by the National Center for Academic Transformation. The estimated cost of an in-class tutor for each Emporium redesigned section of MATH 103 is $10,000 per academic year. This cost was previously paid by a Student Success Committee grant but a G funded allocation would ensure that students continue to receive high-quality assistance in their redesigned classes.
Physics and Engineering Disciplines: To support the AS NS degree, the physics and engineering disciplines have been offering all of the physics and engineering courses that are essential for the engineering pathway. The room PS 109 is used for both lab courses and for lectures courses in the Physics and Engineering discipline. It has not seen a major upgrade in a long time. Over the past few years Leeward CC has seen a tremendous increase in STEM majors taking courses in the Physics and Engineering discipline (more than twice as many are enrolled in PHYS 170 in the spring 2014 semester than in the spring 2012 semester, for example). This calls for a more efficient use of the rooms allocated to the discipline (PS 105 [which is fine for lectures in its current state] and PS 109). Right now there are 10 desktops in PS 109, which are used for data collection, data analysis and engineering design purposes. If these were replaced with laptops that were to be stored in a COW (Classroom On Wheels) we could free up a lot of space when the room would be used for lectures and it would provide much better visibility of the white boards for all the students than at present (where only the 15 students that get a chair in the middle of the room have perfect visibility of the white boards). Also if we got the amount of laptops requested some exercises, like programming [EE 150] and signal analysis [EE 213], could be done with one computer for each student, which would be beneficial for these examples. Beyond the requested laptops the proposal also includes funding for lab hardware, which has a two-fold argument - we have more students than usual so we need more equipment and a lot of our equipment is old and therefore needs an upgrade.

Biology Discipline: The Biology Discipline has seen a dramatic increase in enrollment (an increase of 1128 students registered for Fall 2008 semester to 1638 students registered for the Fall 2013 semester; a 45% increase). This increase in numbers is straining the use of our classroom for lectures and lab. Many rooms are above capacity, making it difficult for students to receive proper instruction. This is especially problematic for lab classes as many of the rooms are dual purpose, used for both lecture and lab. This has the effect of rooms being not ideal for either. While small amounts of renovations can alleviate some issues (i.e., BS 208a and BS 208b), these provide only a limited reprieve. The best solution would be in the construction of a STEM building. This would allow for a number of solutions: (1). Increase in the number and quality of classrooms. (2). Building of dedicated lab spaces. (3). Creation of a science common learning center in which our AS-NS students can interact and collaborate. (4). Increase in the number and quality of classrooms. (5). Building of dedicated lab spaces. (6). Creation of a science common learning center in which our AS-NS students can interact and collaborate.

Additional request from the Biology Discipline for resources are as follows:

1). Upgrade of classroom projectors. Many projectors in the classrooms are old, and have issues with projection. Moreover, the old projectors only have a VGA connection, making any newer devices incompatible with it. Once such device is the Apple TV, which requires an HDMI connector. The Apple TV allows for the wireless connection of any Apple device, including the seemingly ubiquitous iPads. This would allow an increase in the kinds of activities one could perform in class by having students easily share their group work with the whole class, for example. Given the fact that the library has a set of 15 iPads to lend out, and many students carry personal iPads, the use of an Apple TV would be extremely valuable.

2). MS105 Renovation: converting into Cell Culture Lab. Converting existing classroom into tissue culture lab to provide access for cells and tissue culture, microbiology, marine biology and anatomy labs using modern technology and scientific methods. The reason for renovation is
that as a part of our growing STEM program in general, and biology specifically, and the growing demand for modern biotechnology degrees, access to modern science cell biology methods, especially for Native Hawaiian population allows our students to be able to learn and keep up with the most modern techniques. Many of our teaching labs used antiquated techniques and tools, or simulations. There is no cell culture lab accessible to students on Leeward coast.

3). BS 210 Biology Open Lab: Converting existing Lab Manager office into Open Biology Lab.

Reason for renovation: currently there is no Biology Learning Lab available for STEM and non-STEM students. The Biology Discipline has an annual enrollment of approximately 3000 students, not including the summer. About 40% of them take biology labs courses. There is no Open Biology Lab available for self-study, students’ research projects, group work, and access to biological models/specimens for the purposes listed above outside of class time. This remodeling will provide access to an Open Biology Lab for our AN-NS students, meeting students’ demand for self-study.

4). BS211 renovation: Converting existing face-to-face lab classroom into online real-time lab courses delivery. Reason for renovation: currently no real-time lab courses delivery are offered. To provide an access to real-time distance labs to serve students, especially Native Hawaiians population in rural areas, including Waianae Leeward CC, as a part of STEM program and growing demand for biology labs. The equipment for real-time delivery course is available to students at Waianae Leeward CC, but main campus cannot provide the service because does not have the same abilities in Biology.

5). Microbiology Lab Renovation and request for supplies: Reason for request: The sinks that students use do not swivel and the nozzles lack aerators, making them impractical for simple tasks like washing hands, and impossible to use for any wet work required. A set of iPads (or similar tablets) would allow for an integration of active, digital elements to the lab exercises that would involve screen casting and drawing tools that students can use to share and collaborate results and allow for everyone to get involved in discussions. An Apple TV can be incorporated in order to allow for students to share work on the large screen so that all can see. This type of interaction requires that all students use the same tools, running the same operating system, using the same applications. The iPads are a sustainable resource as they require very little maintenance, and are extremely durable. My personal iPad is almost 3 yrs old and it is not slowing down one bit. Laptops, on the other hand, become slow and run down after a year or two.

Chemistry Discipline: The Chemistry Discipline has seen an explosive growth in students from 60 students in Fall 2009 to nearly 160 students in Fall 2013. This is an increase of 3 sections to 8 sections of CHEM 161B/162B during that period. Leeward CC is now the only UHCC campus to offer both Organic Chemistry I and Organic Chemistry II each semester. The Biochemistry course, BIOC 241 has grown from three sections of 30 each in Fall 2009 to five sections in Spring 2014. Despite over tripling the student enrollment in the Chemistry discipline, (Fall 2013 headcount is 358 students in chemistry and biochemistry courses), the discipline is staffed with only two-tenure track chemistry faculty (Michael Reese and Bradley Ashburn) and one tenured faculty (Roger Kwok) who splits time teaching general science/physics and chemistry. Couple this with the assigned time that one of the faculty members receives and this has resulted in the vast majority of the chemistry students being taught by lecturers. Student performance at the beginning of CHEM 272B has seen a significant decline over the years from students who took general chemistry from Leeward CC. This trend follows the dramatic increase in sections taught
by lecturers (six of the eight general chemistry sections). The need for an additional tenure track faculty position member is critical to the continued success of the chemistry discipline and to ensure top-notch instructional quality. Since CHEM 161B/CHEM 162B is a core requirement of the AS NS program, there is a directly impact to the health and quality of the chemistry program.

Earth Sciences (Astronomy, Geology, and Oceanography) Discipline: 1). Geology and Oceanography Labs: Properly conducting classes and/or labs demand many hours of preparation, and setup. A dedicated person, an APT, will be able to properly organize, setup, breakdown, and help teach these classes better and give the instructor time and opportunity to interact and help students directly. 2). Astronomy Observatory: The telescopes and facility works very well, however it also requires immediate maintenance to keep up and tune up the aging facility [lack of maintenance in the very near future could result in complete loss of this facility].

Past years Student Assessments for Astronomy 110 indicated that student learning outcomes improved by 50% to 60% by taking students to the observatory to show various telescope models and their workings. At early evening hours whenever possible (3 to 4 times a semester – weather permitting) students were able to observe planets, stars, nebulae and galaxies that they have seen only in pictures. There is no substitute for real hands on experience. I can see and feel student’s enthusiasm when they operate the telescopes and try to capture picture of a galaxy or a star cluster. A better understanding of the sky, constellations, and movements of the Moon and planets has only fueled student's interest in science and their heritage.

In the past two to four years astronomers and scientists from the mainland universities (MIT, Uni. of Ca, Ohio State) have used the facility to conduct astronomical research and publish scientific papers in Science and other astronomical journals. We have always included students in these research activities and gave them an opportunity to work with professional astronomers. Because of their involvement several students became science majors. One student especially, because of a NASA grant he received in the beginning at Leeward CC; gave him further opportunities to work on Keck Telescopes on Mauna Kea, and at the research lab at IFA located on Maui. One former student attended Maui International Conference on Double Stars last year. Because of one student’s experience, now I have more than six students showed interest in doing double stars research, which is a good way to learn science and work with other astronomers and scientists; and enhance their college and scholarship applications.

Observatory facility also opens to the student body at large on special events such as Venus Transit in 2012; solar and lunar eclipses. More than 150 students viewed Venus Transit in 2012. Students from local K-12 schools and community groups also visit the observatory periodically to view stars. Three students from Waipahu High School are doing their astronomy project at the Kilo Hoku as part of their Senior Project. Young Boy and Girl Scouts come to the observatory for science field trips and earn their badge.

The astronomy facility we have at the Leeward Campus is very unique. No campus on Oahu has such a wonderful facility. Once it is gone, IT is gone! It will take many, many more dollar amount to build on like that. However, a fraction of the cost will keep it going for a long time to come. Furthermore, additional "human support" will help much more to reach both campus students and the community at large, it good for LCC campus public outreach. In the past when we had two or more faculty/staff were involved in helping organize astronomical educational
events. It was a great success. Right now only one faculty member is doing all of the work, which is very tiresome. At this juncture the observatory educational programs would be very successful if it had some personal support. But, I believe it is great education asset for the college.

The following a list of items needed at the observatory for its proper function and usage. (1). The Observatory dome requires maintenance on the mechanical systems. (2). The Observatory Dome needs to be repainted to keep it from rusting. (3). Failed air condition unit needs to be replaced - very critical for expensive optics. (4). A 30% APT personal is highly required to properly manage the facility and its educational activities. (5). Three peer student mentors/student help are required to conduct educational activities to properly benefit students and visitors. (6). Computers need to be up graded.

Plant Biology & Tropical Agriculture: The PBT program offers an AS in PBT. PBT Program Coordinator, Kabi Nuepane request a full time faculty and an APT to support the program. They need a new STEM building, which will include at least two laboratories for the PBT program. One lab will support the plant and soil science lab and other will include the tissue culture laboratory (clean lab). Request is made because the C3-T funding which ends on September 30, 2014 had funded the faculty and other personnel that assisted in formulating and maintaining the program.

Smart Classroom for MS Building: The MS Building has two Smart Classrooms located in MS-201 and MS-202. They are Generation 4 and 3 respectively. There are also four Projector Only Classrooms (MS-102, MS-103, MS-105, and MS-108). For the scheduled air conditioning project during Summer 2014 for the MS Building, all AV equipment is going to be removed by the contractor to enable installing of ducting in the ceilings of the building. This is an ideal time to upgrade the rooms to Smart Classroom Generation 5, which will ensure compatibility with newer devices such as laptops and tablets. The laptops purchased today no longer have VGA ports. They have been replaced with HDMI ports for connection to the projectors. The existing projectors connect using VGA. Therefore, to improve the picture quality and reliability the AV in the rooms should be upgraded.
**Division/Unit/Area Name:** Mathematics and Natural Sciences

**Request for Resource Allocations**

Each prioritized planning list should be limited to the **top five requests** for your division, unit, or area. **Planning requests should be $5,000 or greater in amount.** Some divisions may want to keep a complete prioritized list of items for any amount to use for division fund requests.

- Operating Budget (includes Supplies, Student Help, Technology, Equipment/Furniture, Travel/Professional Development)
- Personnel (positions and release time)
- Repair and Maintenance

**OVERALL DIVISION/UNIT AREA PRIORITIES FOR OPERATING BUDGETS** (This category includes Supplies, Student Help, Technology, Equipment/Furniture, and Travel/Professional Development)

<table>
<thead>
<tr>
<th>Priority</th>
<th>Item or Action and improvement sought</th>
<th>College, Program, or Unit Goal</th>
<th>Data supporting request</th>
<th>New Funding Cost Estimate</th>
<th>If new funding not available: Possibilities for Extramural Funding or Reallocation</th>
</tr>
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<tbody>
<tr>
<td>1.</td>
<td>24 laptops powerful enough to run Solidworks Software</td>
<td>SP Goal A and Goal B</td>
<td>Computers need to be able to support the 3D Mechanical Computer-Aided Design (CAD) program that is needed in Engineering classes,</td>
<td>24 laptops @ $2,000 = $48,000</td>
<td></td>
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</table>
| 2.       | Provide Microscopes for Student use in Biology Labs | SP Goal A and Goal B | Enrollment of students in the biology has risen dramatically over the last five years (1128 in Fall 2008 to 1638 in Fall 2013 - a 45% increase). Much of the equipment used is run down or outdated. A "face lift" would help students by removing the difficulties that come with using underperforming tools | 10 compound microscopes (10 x $1500): $15,000 | 10 compound microscopes (10 x $1500): $15,000 
1 digital compound microscope: $2000 
Total estimate: $17,000 |
3. Supplemental student help appropriation for the Math Lab, Math Testing Center, and MATH 103/140X in-class tutors

<table>
<thead>
<tr>
<th>SP Goal A and Goal B</th>
<th>MATH 103 (largest enrollment transfer level MATH course) success rates:</th>
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<tbody>
<tr>
<td></td>
<td>Fall 2012: 38%</td>
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<td></td>
<td>Spring 2013: 42%</td>
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<td></td>
<td>Fall 2013: 45%</td>
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<tr>
<th>MATH LAB tutoring usage statistics:</th>
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<tbody>
<tr>
<td>AY 2011-2012: 5318</td>
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<tr>
<td>AY 2012-2013: 7339 (38% increase)</td>
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<tr>
<td>Fall 2013: 6515 (note this is for a single semester)</td>
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<tr>
<th>MATH TESTING CENTER usage statistics:</th>
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<tr>
<td>Fall 2012: 10059</td>
</tr>
<tr>
<td>Spring 2013: 10479</td>
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<tr>
<td>Fall 2013: 10609</td>
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</tbody>
</table>

4. Upgrade of facilities used in the Math Testing Center: Testing computers and furniture

<table>
<thead>
<tr>
<th>SSC: Decrease time spent in remedial/developmental classes SP Goal A and Goal B</th>
<th>The Math Testing Center was repurposed and equipped with no dedicated G or special funds</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 computers x $1,200 = $6,000</td>
<td>Computers: The eight-year-old computers are barely fit for current use and would not be suitable for</td>
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</tbody>
</table>
| work stations: 6 x $1,200 = $7,200                                             | }
| 5. | General Equipment request for Biology | College: Promote Native Hawaiian student success through a variety of strategies and interventions with comparable goals as overall student success initiative (Goal A, A.) | Enrollment of students in the biology has risen dramatically over the last five years (1128 in Fall 2008 to 1638 in Fall 2013 - a 45% increase). Much of the equipment used is run down or outdated. A "face lift" would help students by removing the difficulties that come with using underperforming tools | Total: $13,200 |

<p>| | | | - VWR Digital Water Bath, #89032-216: $1100 |
| | | | - Thermo Scientific Barnstead MegaPure Glass Still, Model MP-1, #A440266: $3000 |</p>
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<tbody>
<tr>
<td>6.</td>
<td>Student Help Support for Chemistry, Biology Disciplines (Biology, Botany, Microbiology, Zoology), and Physics / Engineering, Oceanography and Geology Labs</td>
<td>SSC: Increase number of graduates and transfers by 25%</td>
<td>SP: Goal A and B Enrollment in science laboratory classes has increased to warrant additional hours of student help. Comparing AY 2011 and 2013, the number of student increase is as follows: Chemistry labs: 258 to 405 students; Biology Discipline labs: 745 to 794 students; Physics / Engineering: 139 to 178 students.</td>
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<tr>
<td></td>
<td>Thermo Scientific Barnstead MegaPure 9-Liter Bottle for MP-1 Still, #410535: $900</td>
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<tr>
<td></td>
<td>Thermo Scientific Barnstead Water Flowmeter, #440092: $800</td>
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<tr>
<td></td>
<td>Thermo Scientific Barnstead Heater for MP-1 Still, #74080: $760</td>
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<td></td>
<td>Total = $6560</td>
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<tr>
<td>Priority</td>
<td>Item or Action and improvement sought</td>
<td>College, Program, or Unit Goal</td>
<td>Data supporting request</td>
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<tr>
<td>1.</td>
<td>Biology Lab staff (APT Band B, 1.0 FTE)</td>
<td>SSC: Eliminate gatekeeper courses</td>
<td>With the increase in the number of biology students, a new biology APT staff would help alleviate the stress on the current Biology APT placed on lab preparations. Enrollment of students in the biology has risen dramatically over the last five years (1128 in Fall 2008 to 1638 in Fall 2013 - a 45% increase). Biology has increased its labs to include more sections of BIOL 101, BIOL 171L, BIOL 172L, BIOL 275L, ZOOL 240, and ZOOL 241 labs.</td>
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<tr>
<td>2.</td>
<td>BOR approved Math Instructor (Faculty, 1.0 FTE)</td>
<td>SSC: Decrease time spent in remedial/developmental courses to one year or less</td>
<td>Although the enrollment at the College has essentially remained the same, there was an 8% increase in the number of students enrolling in any remedial/developmental math course. This is cause to convert a lecturer position into a full-time Math Instructor position to continue the integrity of the Emporium redesigned classes.</td>
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<tr>
<td>3.</td>
<td>BOR approved Engineering / Physics Instructor (Faculty, 1.0 FTE)</td>
<td>System: Increase STEM graduates</td>
<td>The Engineering/Physics Disciplines have seen a growth in students from 45 students in EE classes and 210 students in Physics classes in Fall 2011 to 80 students in EE classes and 240 students in Fall 2013. This is an</td>
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Increase of 3 sections to 5 sections of EE classes, 10 sections to 11 sections of Physics classes during that period. The discipline is staffed with two-tenure track engineering faculty. With the emphasis in STEM majors and AS NS graduates, a new instructor who assist in course and program development and in the recruitment of STEM students.

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<thead>
<tr>
<th>Priority</th>
<th>Item or Action and improvement sought</th>
<th>College, Program, or Unit Goal</th>
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<th>If new funding not available: Possibilities for Extramural Funding or Reallocation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Upgraded computer to support instructor with new programs such as App Inventor and to enhance instruction.</td>
<td>SSC: Improve student success rates by 10% in all courses with success rates less than 70%</td>
<td>Students from three courses (ICS 110, ICS 136, ICS 236—approximately 75 students) learn to design and program new apps and keep up with new technologies such as the 15 android tablets at $200 each = $3,000 Mac Computer at $2,500 Total = $5,500</td>
<td>$46,512</td>
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REPAIR and MAINTENANCE (R&M)
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<tr>
<td>2.</td>
<td>COW (for laptops), new lectern, 3D printer. For PS 109</td>
<td>android device. These courses involve Mobile Device Application Development, Management, and Programming. The Mac Computer essential in the ICS 136 and ICS 236 courses to teach iphone programming. With the increase in students we need to be able to accommodate more students in PS 109. Laptops, COW, and lectern are a cheap and simple way to achieve this. Bear in mind that PS 109 is used for both lectures and lab. These items will increase the flexibility of the room. The 3D printer is simply to update ME 213, making the exercises more modern. PS 109 has not been maintained in a long time, and these items would help bring the lab up to date. $5,500</td>
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<tr>
<td>3.</td>
<td>Upgrade of network in the Math Testing Center:</td>
<td>College: Build and/or acquire appropriate facilities to deliver educational programs and services in underserved regions of the State, and identify IT installed temporary network lines with used switches to improve connectivity until a permanent solution is implemented. Installing permanent network lines and new switches will improve the reliability of the testing services. $3,500 for network switch, plus $8,000 for running wired lines to and from the switch Total $11,500N</td>
</tr>
</tbody>
</table>
|   | 4. Servicing of compound microscopes | College: Promote Native Hawaiian student success through a variety of strategies and interventions with comparable goals as overall student success initiative (Goal A, A.) | Fall 2012: 10,059  
Spring 2013: 10,479 |   |   |
|---|-----------------------------------|-------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|---|---|
|   | 5. Maintenance work for the Observatory | College: Promote Native Hawaiian student success through a variety of strategies and interventions with  
Astronomy Observatory: The telescopes and facility work very well, however it requires immediate maintenance to keep up and tune up the aging facility [lack of maintenance in the very near future could result in complete loss of this facility] In AY 2013 there were 9 sections of ASTRO 110 with total enrollment of 261 students. | Enrollmment of students in the biology has risen dramatically over the last five years (1128 in Fall 2008 to 1638 in Fall 2013 - a 45% increase). This has come with an increase in the usage of our microscopes. See more in ARRA. | Cost to maintain the observatory is as follows:  
1. Painting the dome $1500,  
2. Maintenance of the mechanical system is $1000, and  
$5,000 |   |
|   |   | comparable goals as overall student success initiative (Goal A, A.) | Each class will use the observatory 4 times each semester. At least 20 students will pursue research projects or work with Hawaiian cultural aspects of the universe using the observatory. | 3. Replace the failed air-condition unit is $3000  
Thus total estimated cost is $5500 |
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<tr>
<td>6.</td>
<td>6.</td>
<td>Replacement of overhead projector and other equipment for each Smart Room in MS Building</td>
<td>SSC: Improve student success rates by 10% in all courses with success rates less than 70%</td>
<td>$90,000</td>
</tr>
</tbody>
</table>

Note on #6: Recommended by Leanne Riseley, Education Media Center Coordinator, to upgrade the MS Building rooms (MS-102, 103, 105, 108, 201, and 202) to Smart Classroom Generation 5 which will ensure compatibility with newer devices such as laptops and tablets. The laptops purchased today no longer have VGA ports. They have been replaced with HDMI ports for connection to the projectors. The existing projectors connect using VGA. The cost for each Smart Classroom installation is $13K. This does not include the price of the iMac ($2K) plus the electrical work (electrical outlets installation on ceiling and walls, lighting zone modifications, fire alarm/occupancy motion sensor relocation and the network installation (switches, jacks, wiring). The actual cost may be as high as $17K per classroom depending on what is actually needed. The infrastructure and networking should be included in the AC renovation project.

Total cost is 6 rooms x $15k = $90k