

Sustainable Construction Technology 2008 Annual Program Review

Introduction

The Sustainable Construction Technology (SCT) program prepares students in general building construction and maintenance of large and small structures, whether commercial, industrial, or residential. It also allows students to explore different trades prior to selecting a specialization. SCT is a new program, authorized to begin officially at the start of the spring 2008 semester. It is a combination and refinement of the former Building Maintenance, Carpentry, and Sustainable Technologies programs. Additional course offerings from the former Welding and Drafting programs have been included. An alignment of goals with the State of Hawaii Construction Academy program recently begun in the local high schools, will allow for students to achieve a smooth transition from high school interest to trained entry level worker in the construction trades upon graduation.

Due to the mid-academic year start of this program, some data will be from the previous Building Maintenance, Carpentry, and Sustainable Technologies programs (fall 2007), and some data will be from the combined and refined Sustainable Construction Technology program (spring 2008). Future annual reports and comprehensive program reviews will rely on data attributable to the Sustainable Construction Technology program only.

The program changes have grown out of a desire to reflect the changes in construction throughout the nation as newer, more efficient technologies have been developed and implemented. An increased awareness of the need to recycle and reuse scarce and expensive resources in our Island environment has necessitated a need to broadly apply sustainable principles throughout the program. In the past, conservation and best use practices have been implemented in individual course work; now the emphasis is on broader application of the principles of conservation and reuse throughout the entire program.

Some program level student learning outcomes include (1) become aware of the requirements of LEED (Leadership in Energy and Environmental Design) certification program, (2) learn efficient construction techniques and use of materials, (3) introduce newer construction materials and processes, (4) maintain a safe and healthy worksite and final construction project, (5) become aware of advances in locally developed energy sources and recycling efforts, (6) minimize the “waste stream” from projects with an emphasis on efficient reuse of formally scrap material, (7) eliminate as far as possible the use of hazardous materials in construction, to prevent such problems as out gassing of chemicals from finished structures, (8) retrofitting existing buildings by affordable energy saving projects with reasonable payback periods for the initial investment, and (9) to relearn and implement the sustainable living practices of the host Hawaiian Culture.

Part I. Quantitative Indicators for Program Review.

Demand

1. Annual new and replacement positions in the State

BLMP	308.7
CARP	114.7
SUSTECH	17.3
2. Annual new and replacement positions in the County

BLMP	57.7
CARP	24.3
SUSTECH	4.0
3. Number of majors

BLMP	16
CARP	8
SUSTECH	33
4. Student semester hours (SSH) for program majors in all program classes

BLMP	N/A
CARP	3
SUSTECH	N/A
5. Student semester hours for non-program majors in all program classes

BLMP	N/A
CARP	40
SUSTECH	N/A
6. Student semester hours for all program classes

BLMP	220
CARP	43
SUSTECH	37
7. FTE program enrollment

BLMP	15
CARP	3
SUSTECH	5
8. Number of classes taught

BLMP	10
CARP	2
SUSTECH	2
9. Determination of the program's health based on demand (Healthy, Cautionary, or Unhealthy)

BLMP	Cautionary
CARP	Cautionary
SUSTECH	Healthy
COMBINED	Healthy (due to growth projections and combination)

Efficiency

10. Average class size

	BLMP	14
	CARP	8
	SUSTECH	10
11. Class fill rate		
	BLMP	85.2%
	CARP	112.5%
	SUSTECH	168.8%
12. FTE of BOR appointed faculty		
	BLMP	1.0
	CARP	0.0
	SUSTECH	1.0
13. Student/Faculty Ratio		
	BLMP	N/A
	CARP	0.3
	SUSTECH	N/A
14. Number of majors per full time faculty		
	BLMP	N/A
	CARP	N/A
	SUSTECH	7.0
15. Program Budget allocation (personnel, supplies and services, equipment)		
	BLMP	N/A
	CARP	N/A
	SUSTECH	N/A
16. Cost per student semester hour		
	BLMP	\$67
	CARP	\$67
	SUSTECH	\$67
17. Number of classes that enroll less than ten students		
	BLMP	3
	CARP	1
	SUSTECH	2
18. Determination of the program's health based on Efficiency (Healthy, Cautionary, or Unhealthy)		
	BLMP	Cautionary
	CARP	Cautionary
	SUSTECH	Cautionary
	COMBINED	Cautionary (but with upward growth trends in near future)

Effectiveness

19. Persistence of majors fall to spring		
	BLMP	57.1%
	CARP	71.4%
	SUSTECH	70.0%
20. Number of degrees and certificates earned (annual)		
	SUSTECH	A.A.S 2

	C.A.	2
	C.C.	17
BLMP	C.A.	2
	C.C.	32
CARP	C.C.	4
DRAF	C.C.	4
ENGY	C.C.	21
WELD	C.C.	6

21. Number of students transferred (enrolled) to a four year institution

Perkins Core Indicators:

BLMP	0
CARP	0
SUSTECH	0

22. Academic Attainment (1P1)

BLMP	100%
CARP	100%
DRAF	N/A
ENGY	N/A
WELD	N/A

23. Technical Skill Attainment (1P2)

BLMP	100%
CARP	100%
DRAF	67%
ENGY	100%
WELD	N/A

24. Completion rate (2P1)

BLMP	0.0%
CARP	0.0%
DRAF	N/A
ENGY	0.0%
WELD	N/A

25. Placement in Employment, Education, Military (3P1)

BLMP	N/A
CARP	N/A
DRAF	N/A
ENGY	100%
WELD	N/A

26. Retention in employment (3P2)

BLMP	N/A
CARP	N/A
DRAF	N/A
ENGY	100%
WELD	N/A

27. Non Traditional Participation (4P1)

BLMP	28.6%
CARP	33%

	DRAF	75%
	ENGY	28.6%
	WELD	33.3%
28.	Non Traditional Completion (4P2)	
	BLMP	50.0%
	CARP	N/A
	DRAF	N/A
	ENGY	N/A
	WELD	N/A
29.	Determination of program's health based on effectiveness (Healthy, Cautionary, Unhealthy)	
	BLMP	Cautionary
	CARP	Unhealthy
	SUSTECH	Cautionary
	COMBINED	Cautionary (but with upward growth trends in near future)

Part II. Analysis of the Program

General:

The combination of the Building Maintenance, Carpentry, and Sustainable Technology Programs into the unified Sustainable Construction Technology Program is recognition by the University of Hawaii that we must adapt to change to be successful. In the past, training in an individual trade or function was the norm, and few people would make substantial changes to their careers during their lifetime work cycle. Today, frequent adjustment and change is the norm, as individual needs and the community's needs are adjusted. In addition, the clear line between trades and work assignments has changed, as we begin to look at construction as a unified endeavor, where one person's work affects the area of another's. Newer materials, processes, energy standards, and complexities of the modern building require a unified approach to construction as the new program will allow. In addition, new sustainable energy initiatives on the part of the new National Administration will lead to our graduates being in great demand locally, statewide, and even nationally. The cautionary status (compared with the healthy aspect of the energy courses) is a reminder of the direction we must head in the future in order to better serve our students and community.

Strengths and weakness in terms of demand, efficiency, and effectiveness based on an analysis of the data.

The consolidation of the three relatively weak (cautionary) programs will strengthen the offering of Sustainable Construction Technology courses in the future, and give our students proper training for the careers of the future.

The wide range of skills needed for faculty in the program calls for the employment of unique and talented individuals. Not just multitaskers, the program requires individuals with a wide range of technical skills and experience in order to keep the focus of the program on teaching the latest sustainable skills. Unfortunately, the recent retirement of

Don Ainsworth (July 2008) and the upcoming retirement of Mark Slattery (December 2008) may lead to a short period of low enrollments until the new faculty have stabilized their reputations as innovative educators.

The program is actually conducted in several different shop areas of the MCC campus that were originally built in 1946. While initially set up along traditional “trade” divisions, the broad nature of instruction in the new program can be enhanced by conversion of these older facilities to several “focused” shops and classrooms. The old nature and condition of the existing shops can actually become a strength, since much of the work of updating the shops can be accomplished by program students as part of their regular coursework, under proper supervision by program faculty.

An example of this “weakness becoming strength” concept, is a recent partnership with the Rural Development Program (RDP) related to training workers in the new field of photovoltaic (PV) panel installation. A training grant was acquired in fall 2007 to train workers to install a “stand alone” PV system in a remote area of the campus. After the training session ended, the PV modules were disassembled and stored for future use.

During this same time period (fall 2007 to present) three of the four major shops had their asbestos (transite) roofs replaced with standing-seam metal roofing. These were the original roof materials from 1946. Previously, the roofs could not be touched, drilled, modified, or had anything added to them due to the potential toxic nature of the disturbed roof material itself. The conversion to standing seam metal roof (ideal for PV support) will allow another cycle of training under a separate RDP grant for a permanent installation of these panels, and a connection of the power generated to the MCC electrical grid, reducing the overall cost of electricity to the campus.

The shop roofs have long been noted as ideal for PV installation, but the transite roof panels prohibited any such system in the past. The roof areas are very large, with a direct southern exposure, and tilted at the optimum 22 degrees to the horizontal for our latitude. The axis of the roof is on an exact east west alignment, resulting in a fairly simple frame construction to support the PV panels. This will be a vast improvement over the present small, scattered, intertied PV networks on campus, which contribute only a token amount to campus energy savings. These existing lab modules have been difficult to monitor and use as an effective element in a Sustainable Technology Program.

Students who could not necessarily see the results of the Sustainable Construction Technology Program efforts, will have a visible reminder of the possibilities for those educated in the program.

Significant Program Actions (new certificates, stop-out; gain/ loss positions, results of prior year’s action plan)

The major program action of the past year or so has been the formal recognition of the Sustainable Construction Technology Program by the Board of Regents, and its implementation with an initial starting date of the beginning of the spring 2008 semester.

At the same time, the Building Maintenance, Carpentry, and Sustainable Technology Programs have been stopped-out. Some continuously enrolled students may elect to finish their studies under the former programs. The existing Certificates of Completion and the existing course alphas have been retained, in order to maintain continuity and recognition in the community.

Two full time faculty retired or will retire during 2008; one position has been filled, and the other will shortly be advertised for hiring.

The previous year action plan primarily focused on completing the program changes and updating the various elements of the curriculum. This has largely been accomplished, but as with all major curriculum actions, some small adjustments may need to be made over the next year or two.

30. Determination of program's overall health (Healthy, Cautionary, Unhealthy)

The three programs that have been combined into the Sustainable Construction Technology Program were all at the cautionary level. This was largely due to a lack of focus on new technology at the program level, dilution of available resources, fragmented nature of the course offerings, and lack of a plan for updating facilities. Combining the programs plus the enhanced focus on needed across the board energy and material saving techniques, will stand the test of time over the next few years and return the Maui Community College trade programs and courses to healthy status.

Part III. Action Plan

- 1) Complete the planned major PV installation on the current Building Maintenance Program Shop, and tie into the electrical grid. Use student workers with proper supervision and integration with the classroom lab experience for as many individual courses as possible.
- 2) Repair the roadway thermal solar collectors in front of the ELEC 23 lab as an example of affordable solar water heating without excessive use of exotic and expensive materials. Provide remote instrumentation in the same area where the PV monitoring meters are located.
- 3) Consolidate teaching of classes in all phases of the Sustainable Construction Technology Program to the former, Building Maintenance, Carpentry, and Welding shops. This will enable more efficient use of existing facilities and pull together far flung class meeting places across campus. This will also help students and the community to identify the locus of the program. The three classrooms and shops could become specialized and adapted for unique needs. For example, welding, plumbing and some solar thermal heating courses could be taught in the Welding shop, since they all involve the use of combustible bottled gasses. Unused material could be removed from this shop and 16 generalized and adaptable work stations could be set up for solar thermal and plumbing, in addition to the existing welding stations. Additional secure storage would

be needed.

- 4) Consolidation for the former Building Maintenance shop could involve the other energy courses, prevention courses, lectures, and health and safety offerings. The classroom should be equipped with the latest delivery options, including Elmos and computerized overhead projection. The same overhead projector has been used in this classroom for 31 years!
- 5) Upgrade the computers for faculty in the program to more recent models with video/media integration. Classroom presentations will be enhanced. At present, old out-of-date computers frequently lose data and are generally “clunkers.”
- 6) Since the formal start of the program in spring 2008, we have had increasing cooperation with the counseling department, and students have been tracked more aggressively. Continued faculty advising and increased success with student retention is essential.
- 7) Review all the equipment and material needs, and increase funding to replace outdated tools.
- 8) Increase program budget to accommodate new tools, materials, and course software.
- 9) Past efforts with Service Learning should be continued and increased. A partnership with Habitat for Humanity on Maui has been very successful and given students many hand-on opportunities with varied skills and trades. Additional partnerships should be explored.
- 10) As the two long term faculty have retired or will shortly retire, hire full time faculty with sufficient broad range of skills to accomplish program goals.
- 11) Increase the lecture pool to enable specific expertise for narrow focused courses.
- 12) Review and update the curriculum to keep it in line with developing industry trends, while making sure that the basics (including verbal and computational skills) are adequately covered.
- 13) Develop a relationship with the Hawaiian Studies Program at Maui Community College, in recognition of ancient Hawaiian principles of sustainability and respect for the Aina. One possible way is to have some class visitation and discussion where sustainability within the ancient Culture is explored and adapted to modern times.

Part IV. Resource Implications (physical, human, financial)

Several financial implications have been discussed under the program overall health and action plan sections. These include modernizing classroom and lab facilities, increased

budget, hiring lecturers, partnerships with outside agencies, and investment in sustainable technology. While noting these cost increases, it should be noted that the partnership that resulted in the installation of the photovoltaic power system on the shop roof, will contribute significantly to an overall downward trend to the cost of electric energy on campus. By implementing future Sustainable Construction Technology projects that produce natural energy on campus, we will help to hold the line on costly utilities as well as continuing the vision of the program developers.