Program Evaluation

Date: January 21, 2012

Program Evaluated:

Certificate of Achievement in Refrigeration and Air Conditioning

A. Program Goal:

Its primary purpose is to provide students with marketable entry-level skills in the refrigeration and air conditioning industry or any related field/career. It is designed to qualify students to take external licensure, vendor-based, or skill standards examinations in the field. If standardized external exams are not available in the field of study, the program prepares students at skill levels expected of employees in an occupation found in the local economy.

Program Learning Outcomes:

1. Identify safety and occupational health requirements in the Refrigeration and Air Conditioning industry.
2. Use specified hand and power tools for Refrigeration and Air Conditioning.
3. Perform basic hand skills in maintaining Refrigeration and Air Conditioning system to a given specifications.
4. Read and interpret basic electrical drawing and symbols related to Refrigeration and Air Conditioning.
5. Perform basic troubleshooting and repair of domestic refrigeration and air conditioning units.
6. Participate in the Refrigeration and Air Conditioning profession.

B. Program History

The program was created by recommendations of Pohnpei Campus Advisory Council to offer a certificate of achievement (COA) in refrigeration and air conditioning to train local students to acquire skills in installing, maintaining and

repairing of the stated equipment and devices which was a needed skill in the community and the local workforce.

Milestones:

2005 - One full time instructor was recruited to assist in designing curriculum and offered courses. Modification of the existing program was also done. In the same year, the first batch of refrigeration and air conditioning major students are composed of twelve (12) new students.

2006 – The students have been involved in building instructional material projects such as fan motor, compressor motor trainer, refrigeration cycle trainer and split type air conditioning installation trainer.

2007 – The students are actively involved in the first yearly Technology and Trade Exhibit event of the college. Some students are assigned to work in the maintenance department of the college Pohnpei state campus, under the work study program to perform preventive maintenance of classrooms and offices air conditioning units.

2008 – The college purchased some modern refrigeration and air conditioning instrument and equipment used for instructional purposes to improve the program offerings. Students registered in this program are also in-charge in the installation, repair and maintenance of all air conditioning units at the Technology and Trade Division classrooms and offices.

2010 – The program had one graduate student to be able to enter the apprenticeship training program under the USDOL, FSM education department and the college.

2011 - Refrigeration and Air Conditioning Students Club (RACSC) was established with a mission of creating an open environment for refrigeration students to engage in professional and personal growth.

C. Program Description

This program is design to teach the students the principles of refrigeration and air conditioning. It is design to train students in installing, servicing and maintaining domestic and small commercial refrigeration systems.

D. Program Admission Requirements

A student must be a high school graduate or GED certificate holder. Applicants must take the COM-FSM entrance test (COMET) and be accepted by the Admissions Board. Acceptance by the Admissions Board is based on the applicant's score on the COMET and other criteria as defined by the Admissions Board.

E. Program Certificate Requirements

Program requirements:

General Education Requirements:----------14 credits

MS 104 Technical Math I (4)

MS 106 Technical Math II (4)

ESL 050 Technical English (3) or SS 100 World of Work (3)

CA 100 Computer Literacy (3)

Technical Requirements:----------21 credits

VEM 105 Basic Electricity for A/C (3)

VEM 110 Workshop Fabrication (3)

VEM 111 Electrical Wiring I (3)

VEM 113 Refrigeration I (4)

VEM 114 Refrigeration II (4)

VWE 115 General Welding (4)

Total credits requirements: 35 credits

F. Program Courses and Enrollment

Below are tables showing the program courses and enrollment figures:

Table 1: Fall Semesters (2005 – 2011)

Courses number & Description	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
A. General Education Requirements							
ESL 050 Technical English or SS 100 World of Work	12	8	10	9	2	2	2
MS 104 Technical Math I	0	0	1	1	2	1	5
B. Technical Requirements							
VEM 105 Basic Electricity for A/C	12	9	16	n/o	15	14	10
VEM 110 Workshop Fabrication	12	9	8	n/o	14	13	9
VEM 113 Refrigeration I	12	8	10	8	13	15	13

Table 2: Spring Semesters (2006-2011)

Courses number & Description	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
A. General Education Requirements							
MS 106 Technical Math II	0	0	1	2	1	4	
B. Technical Requirements							
VEM 111 Electrical Wiring I	8	9	7	3	n/o	11	n/o
VEM 114 Refrigeration II	7	9	7	7	9	14	8
VWE 115 General Welding	7	10	7	n/o	4	8	12

Table 3: Summer Classes (2006- 2011)

Courses number & Description	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	
CA 100 Computer Literacy	7	9	10		4	5	

Source: COM-FSM Student Information System Record and Instructor Class Record from Fall 2005-Summer 2011

G. Program Faculty

Full Time Faculty

1. Bertoldo Esteban Jr. – Associate Professor
   BSIE major in Refrigeration and Air Conditioning
   MIST, Philippines

   Master of Arts in Teaching (MAT) major in Electrical Technology
   MIST, Philippines

Source: COM-FSM Personnel Listing and Pohnpei Campus Director Quarterly Report 1st Quarter 2011

H. Program Outcome Analysis

The following are sets of health indicators data that were collected and analyzed:

1. Program Enrollment

During fall semesters (see Table 1), enrollment in the program courses are consider normal except in MS 104 Technical Math I. All new students registered in the program are not qualified to enroll in that course base on the result of their COMET. They need to take a mathematics subject which is equivalent to their COMET placement result.

During spring semesters (see Table 2), there are slight changes in the number of students registered in the program courses. Again, the main problem is the MS 106 Technical Math II course. There are no or only few students are qualified to register in that course.

The certificate program only allows student to complete all the required courses within three (3) semesters but because of the Technical Math 104 and 106 problem, most of them already consumed their allotted three semesters but still did not finished their program.

2. Graduation Rate

Referring into the Table 1, 2 and 3, you will observe that since the program started last fall 2005, probably there are only 6 students who completed the Certificate of Achievement in Refrigeration and Air Conditioning program.

Most students in the program are finished with all there technical courses requirement but still they cannot graduate because of the Technical Math 104 and 106 courses.

3. Average Class Size

The ideal class size for each course was base on room size, equipment and safety concerns. Minimum is ten (10) and maximum is fifteen (15). There are some cases the class size exceed on its maximum to accommodate graduating students.

4. Students' Seat Cost

No available data

5. Course Completion Rate for the Programs

Base from the instructor's class record and from the COM-FSM student information system record, the course completion rate of the program are all good except from the Technical Math 104 and 106 courses.

Course	***Fall 08***	***Spring 09***	***Fall 09***	***Spring 10***	***Fall 10***	***Spring 11***	***Mean percentile***
VEM 105		9 out of 9, 100%	12 out of 15, 80%		14 out of 15, 93%	13 out of 14, 93%	92%
VEM 110		6 out of 7, 86%	11 out of 14, 80%		13 out of 13, 100%	14 out of 15, 93%	90%
VEM 113			13 out of 15, 87%		15 out of 15, 100%	12 out of 14, 86%	91%
VEM 111			11 out of 15, 73%			15 out of 16, 94%	84%

VEM 114		7 out of 7, 100%		10 out of 10, 100%		14 out of 14, 100%	100%
VWE 115			12 out of 12, 100%	9 out of 10, 90%		12 out of 13, 93%	94%

Source: Program instructors class record book.

6. Students' Satisfaction Rate

The data collected and shown are the student evaluation for course instructor. It was gathered at the office of Instructional coordinator at Pohnpei campus. The data show course code and semester, evaluation criteria, general weighted average, number of student evaluator and the legend which describe the degree of rated points.

Student evaluation criteria for course instructor	VEM 113/F09	VEM 105/F09	VEM 110/F09
1. Keeps regular schedule every class day.	5	5	5
2. Shows interest in the subject.	5	5	5
3. Gives individual help as needed.	5	5	5
4. Avails himself/herself for student conference.	5	5	5
5. Welcomes questions, suggestions and discussion from students.	5	5	5
6. Shows interest and respect for students.	5	5	5
7. Helps the students in meeting individual learning needs.	5	5	5
8. Uses classroom lab fully.	5	5	5
9. Provides clear directions for assignment and instruction.	5	5	5
10. Grades fairly and frequently.	5	5	5
11. Makes the purpose of the course clear.	5	5	5
12. Talks clearly at an easy-to-follow speed.	5	4	5
13. Lessons are well paced with activity as well as lecture.	5	5	5
14. Makes the course interesting.	5	5	5
15. Textbooks were appropriate and helpful.	5	5	5
General weighted average	**5**	**5**	**5**
Number of students evaluator =	**13**	**15**	**14**

Legend: *5 = Always 4 = Usually 3 = Sometimes 2 = Rarely 1 = Never*

Student evaluation criteria for course instructor	VEM 114/S10	VWE 115/S11	VEM 111/S11
1. Keeps regular schedule every class day.	5	5	5

2. Shows interest in the subject.	5	5	5
3. Gives individual help as needed.	5	5	5
4. Avails himself/herself for student conference.	5	5	5
5. Welcomes questions, suggestions and discussion from students.	5	5	5
6. Shows interest and respect for students.	5	5	5
7. Helps the students in meeting individual learning needs.	5	5	5
8. Uses classroom lab fully.	5	5	5
9. Provides clear directions for assignment and instruction.	5	5	5
10. Grades fairly and frequently.	5	5	5
11. Makes the purpose of the course clear.	5	5	5
12. Talks clearly at an easy-to-follow speed.	5	5	5
13. Lessons are well paced with activity as well as lecture.	5	5	5
14. Makes the course interesting.	5	5	5
15. Textbooks were appropriate and helpful.	5	5	5
General weighted average	**5**	**5**	**5**
Number of students evaluator =	**9**	**8**	**11**

Legend: *5 = Always 4 = Usually 3 = Sometimes 2 = Rarely 1 = Never*

7. Employment Data

Name	Current Employer
1. Jimmy Silbanuz	RAC Apprentice, COM-FSM
2. Prenston Ioanis	RAC mechanic, 4TY Refrigeration and Air Conditioning, Kolonia, Pohnpei State

8. Transfer Rate

Most of the students who completed there technical courses requirement in the program are transferring into AAS Degree program to avoid the cancellation of their education benefits and also while completing there Technical Math courses.

Name	Degree	Current School Enrolled
1. Eperiam, Kramwel	AAS	COM-FSM Pohnpie
2. Francisco, Michael Leo	AAS	COM-FSM Pohnpie
3. Ludrick, Santrickson	AAS	COM-FSM Pohnpie
4. Silbanuz, Jimmy	AAS	COM-FSM Pohnpie
5. Santos, Nathaniel	AAS	COM-FSM Pohnpie

9. Program's Student Learning Outcomes

1. Identify safety and occupational health requirements in the Refrigeration and Air Conditioning industry.
2. Use specified hand and power tools for Refrigeration and Air Conditioning.
3. Perform basic hand skills in maintaining Refrigeration and Air Conditioning system to a given specifications.
4. Read and interpret basic electrical drawing and symbols related to Refrigeration and Air Conditioning.
5. Perform basic troubleshooting and repair of domestic refrigeration and air conditioning units.
6. Participate in the Refrigeration and Air Conditioning profession.

10. Students' Learning Outcomes for Program Courses

VEM 105 Basic Electricity for Air Conditioning

1. Discuss fundamentals of electricity.
2. Manipulate electrical measuring instruments.
3. Determine the electrical components of domestic refrigeration system.
4. Analyze electrical diagram of domestic refrigeration and air conditioning unit.
5. Troubleshoot electrical defects of domestic refrigeration and air conditioning system.
6. Repair electrical defects of a domestic refrigeration and air conditioning system.

VEM 110 Workshop Fabrication

1. Describe the types of tubing used and refrigeration work.
2. Explain tube processes.
3. Perform soldering and brazing techniques.
4. Demonstrate how to use various hand tools.
5. Determine how to maintain and calibrate gauges.
6. Demonstrate the steps of using various equipments in servicing refrigeration system.

VEM 113 Refrigeration I

1. Discuss the fundamentals of refrigeration.
2. Perform basic shop practices.
3. Determine the different compression refrigeration systems.
4. Recognize the common refrigerants.
5. Troubleshoot and repair mechanical defects of domestic refrigeration system.

VEM 111 Electrical Wiring I

1. Understand the electrical system and demonstrate the various installation methods.
2. Explain and identify electrical symbols and conductors.
3. Design an electrical wiring schematic.
4. Identify and install electrical boxes, switches and recessed lighting.
5. Recognize electrical interrupters and suppressors.
6. Understand ballast.
7. Describe branch circuit.
8. Identify various conductor sizes.
9. Identify and demonstrate bedroom, master bedroom and bathroom circuit.
10. Identify and demonstrate hallway, front porch and entry circuit.
11. Identify and demonstrate kitchen and dining room and living room circuit.
12. Understand and demonstrate laundry circuit.
13. Identify and demonstrate study, rear entry and family room circuit.
14. Explain workshop circuit and demonstrate the installation method.
15. Demonstrate water pump and water heater circuit.
16. Identify and perform stove and oven circuit installation.
17. Identify and explain food disposer and dishwasher circuit.
18. Understand and install vent fan circuit.
19. Understand and demonstrate electric heating and air conditioning circuit.
20. Recognize and demonstrate heat and smoke detector circuit.

VEM 114 Refrigeration II

1. Discuss fundamentals of air conditioning.

2. Install split type air conditioning system.
3. Perform servicing and maintenance of split type air conditioning system.
4. Recover and recycle refrigerant in the system.
5. Troubleshoot defects of split type air conditioning system.
6. Repair mechanical and electrical defects of split type air conditioning system.

VWE 115 General Welding

1. Discuss introduction to welding.
2. Explain welding safety.
3. Recognize types of weld and joints.
4. Set-up and operate oxy-acetylene and electric arc welding equipment.
5. Perform oxy-acetylene and electric arc welding practices.
6. Determine the causes and remedies of welding defects.

i.a. Discussion of Findings

The above program evaluation has resulted in the following findings:

1. Majority of students registering in the program have a very low Math placement base from there COMET result. They are not qualified to register directly into the Math requirement of the program which is the MS104 and MS106. They need to pass all the pre-requisite of MS104 before they can register on the said Math level.

   As a result, there are no students capable to finish their certificate program for three (3) semesters only as required by their education grant.

2. Most students completed their technical requirements tend to change major to AAS in Building Technology major in Electrical technology without finishing their certificate program. These situations affect the graduation rate of the certificate program.

3. Program courses learning outcomes for VEM 113 Refrigeration I and VEM 114 Refrigeration II requires mastery of multiple skills. The three (3) hours of

workshop that we are using now is not enough to acquire the mastery of the skills stated in the program courses learning outcome. Students need more time in doing practical exercises to acquire the necessary skills in installation, servicing and troubleshooting of refrigeration and air conditioning systems.

3. Global warming and Ozone layer depletion are now international issues. Most countries in the world are trying to find a way to control these environmental problems. Refrigeration and air conditioning industry is one contributor of this global problem because of the refrigerant gas that we are using to produce cooling. Improper handling that result to excessive release of this CFC gasses into the atmosphere is now prohibited by laws in most countries.

i.b. Recommendations

To achieve the COM-FSM Mission Statement as stated below;

"Historically diverse, uniquely Micronesian and globally connected, the College of Micronesia-FSM is a continuously improving and student centered institute of higher education. The college is committed to assisting in the development of the Federated States of Micronesia by providing academic, career and technical educational opportunities for student learning.

The College of Micronesia-FSM, through a cycle of assessment and review, will continuously improve to meet or exceed current accreditation standards and will:

- Promote learning and teaching for student success and satisfaction.
- Build a partnering and service network for student success, and workforce and economic development.
- Provide for continuous improvement of programs, services and college environment. "

To be globally connected, the above program should also reflect the current trends in the global industry and training to enable our students to find jobs at home and abroad.

In view of the above findings, the initiator of this program evaluation, strongly recommend major changes in the program such as;

1. **Change the MS 104 Technical Math I and MS 106 Technical Math II to a lower level as a program general education requirement or if not, allow the new student to register directly into MS 104 Technical Math.**

   Referring to table 1 and 2 of this writing and from the Student Information System record, these courses are the main cause of very low rate of graduates in the program. The main objective of the program is to develop a highly skilled refrigeration and air conditioning mechanic/technician not to develop a Math expert. They are consuming most of their time in completing Math requirements rather than their technical courses requirements.

2. Create **Advance Certificate of Achievement** and **Associate of Applied Science in Building Technology Major in Refrigeration and Air Conditioning** to give opportunity to the students who are interested to earn a degree and to be able to compete globally in the workforce of this field of specialization. This will help also to encourage students and the community to enter into this program.

3. **Change the 1 credit 3 hour laboratory into 2 credits 6 hours laboratory for the following program courses, VEM 113 Refrigeration I and VEM 114 Refrigeration II.**

   To develop a highly skilled mechanic in the field of refrigeration and air conditioning we need to expose the students to a longer period of hands-on activities. More practice makes them more skilled and develop their self-confidence in their jobs. As most educators in this trade area suggested, learning is more effective if we provide 30 percent of theory and 70 percent of hands-on.

With this, we can assure that mastery of the skills required in the field of refrigeration and air conditioning trade will be acquired by the students.

We offer VEM 113 Refrigeration I every fall semester only and VEM 114 Refrigeration II every spring semester only, the 46 hours of hands-on time allotted on these courses for the students to perform practical exercises are not enough to meet the mastery of the skills needed. There is no need to add another refrigeration courses, I propose to only add the laboratory time.

Existing Training Duration

Courses	Lecture time	credits	Laboratory time	credits	Total credits
VEM 113 Refrigeration I	3 hrs/wk	3	3 hrs/wk	1	4
VEM 114 Refrigeration II	3 hrs/wk	3	3 hrs/wk	1	4

Total lecture time per semester = 3 hrs X 16 weeks/semester = 48 hours
Total Laboratory time per semester = 3 hrs X 16 weeks/semester = 48 hours
Total hours per semester = 96 hours

Suggested Training Duration Changes

Courses	Lecture time	credits	Laboratory time	credits	Total credits
VEM 113 Refrigeration I	3 hrs/wk	3	6 hrs/wk	2	5
VEM 114 Refrigeration II	3 hrs/wk	3	6 hrs/wk	2	5

Total lecture time per semester = 3 hrs X 16 weeks/semester = 48 hours
Total Laboratory time per semester = 6 hrs X 16 weeks/semester = 96 hours
Total hours per semester = 144 hours

4. **Purchase one Recovery and Recycling Machine for the program training purposes used**

COM-FSM as an institution of learning can help in our small way to prevent global warming and ozone depletion by training our students in the refrigeration and air conditioning program the proper handling of refrigerant. We must train them how to use the Recovery and Recycling machine to avoid venting an excessive amount of CFC gasses in the air during servicing.

Global warming causes severe drought and flooding in other areas of the world while Ozone depletion causes several sicknesses such as skin cancer, eye cataract and damage to sea life and crops.

THERE IS ONLY ONE WORLD TO LIVE…

LET US HELP TO PROTECT OUR MOTHER EARTH!!