Program Creation Process Check List

Program Title: Associate in Science Degree in Air Conditioning & Refrigeration Technology
Division: BSS **Proposing Faculty name(s):** Mark Likeness – Foothill P/T Faculty
Type of Program: _____ Transfer or X Workforce
Type of Award:
____ Non-transcriptable certificate
____ Certificate of Achievement
X AA/AS Degree

Documentation checklists:

Transfer documentation
_____ Catalog Description
_____ List of Courses
_____ Articulation & transfer data
_____ Identification of existing program(s) at CSU/UCs
_____ Completer Projections
_____ Identification of any additional resources needed to establish program (i.e. faculty, equipment, etc.)

Workforce documentation
X Catalog Description
X List of Courses
X Completer Projections
X Labor Market information
X Identification of any similar program(s) in the area
X Identification of any additional resources needed to establish program (i.e. faculty, equipment, etc.

Transfer/Workforce Work Group Comments/Recommendations:
Recommend Approval

Work Group Signature: [signature] Date: 12/11/13

~~Operations Planning Committee~~ Comments/Recommendations:
VP
This degree strengthens the existing program.
Recommend Approval.

~~OPC~~ VP Signature: [signature] Date: 12/13/13

Planning & Resource Committee Comments/Recommendations:

PaRC Signature: Date:

Division Curriculum Committee Comments/Recommendations:

Division CC Signature: [signature] Date: 11/26/13

Following the review by the listed committees, this form should be forwarded to the Office of Instruction.
11/14/13

FOOTHILL COLLEGE
Credit Program Narrative
Associate in Science Degree in Air Conditioning and Refrigeration Technology

Item 1. Program Goals and Objectives

Foothill College is responding to local demand for Pipe Trades workers in Refrigeration, Heating, and Air Conditioning by establishing an Associate in Science degree in Air Conditioning and Refrigeration Technology in partnership with the Loyd E. Williams Pipe Trades Training Center (PTTC), located in San Jose, CA. Graduates are recognized as journeypersons within the Pipe Trades industry. Graduates of the Associate in Science degree in Air Conditioning and Refrigeration Technology program will be employable as a: Journeyman Commercial Plumber/Industrial Plumber, Foreman, and General Foreman. Students earning a certificate in Refrigeration and Air Conditioning Mechanical Service will increase their marketability and employment opportunities.

The Associate in Science degree in Air Conditioning and Refrigeration Technology at Foothill College serves to align apprenticeship programs with college and university academic tracks as directed by the federal and state government. Foothill College and the Loyd E. Williams Pipe Trades Training Center (PTTC) are collaborating in an LEA program with the Division of Apprenticeship Standards (DAS) for the state of California.

The program learning outcomes for the Associate in Science degree in Air Conditioning and Refrigeration Technology are:

- In compliance with applicable standards and codes, students will demonstrate ability to install and remove refrigeration, heating, air conditioning, and ventilation systems, including the appropriate electrical/electronic control systems.

- In compliance with applicable standards and codes, students will demonstrate ability to maintain, repair, extend, and/or alter refrigeration, heating, air conditioning, and ventilation systems, including electronic control systems.

Students complete the an Associate in Science degree in Air Conditioning and Refrigeration Technology through enrollment in the Refrigeration and Air Conditioning apprenticeship program at the PTTC. To apply to the PTTC apprenticeship program, potential students must be at least 18 years of age, be able to perform the work of the trade, present verification of high school completion, either through a high school diploma or GED or High School Proficiency certificate, and demonstrate the ability to read, write, and speak English. The selection, employment and training of apprentices by the PTTC is without discrimination according to race, color, national or ethnic origin, age, gender, religion, sexual orientation or marital status. Students are admitted into the PTTC apprenticeship program based on obtaining a passing (75%) score on the "Pipe Trades Entrance Exam,' an exam which measures the student's ability in math and mechanical reasoning. Students who pass the entrance exam are selected from an applicant waiting list, the order of which is established by the date the entrance exam was taken and the test score. Admission to apprenticeship classes is limited to apprentices registered with the California Department of Apprenticeships Standards. This limitation is authorized by the California Labor Code, Section § 3074.3.

Aside from Foothill College's ordinary enrollment fees, there are no additional costs to the student to complete the Associate in Science degree in Air Conditioning and Refrigeration Technology.

In accordance with the State Chancellor's office, the goals and objectives of the Associate in Science degree in Air Conditioning and Refrigeration Technology align with the primary mission of California community colleges, as established in Ed. Code § 66010.4, which mandate that community colleges provide vocational instruction to students and to advance California's economic growth and global competitiveness through education and training that contribute to workforce development. The Associate in Science degree in Air Conditioning and Refrigeration Technology aligns with Foothill College's Institutional Outcomes and directly supports the Computation and the Creative, Critical, and Analytical Thinking rubrics.

Item 2. Catalog Description

The Associate in Science degree in Air Conditioning and Refrigeration Technology program is conducted in partnership with the Pipe Trades Training Center apprenticeship program. The apprenticeship program is five years in duration, requiring a minimum of 9,000 hours of on-the-job training. After 5 years of classroom and paid work experience, students are recognized as journeypersons within the Pipe Trades industry and work to insure indoor air quality by servicing and repairing all types of refrigeration equipment in all sizes of buildings, complex air conditioning, heating, and refrigeration units used in hospitals, skyscrapers, manufacturing facilities, and research development laboratories. Graduates of the Associate in Science degree in Air Conditioning and Refrigeration Technology program will be employable as: Service Manager, Facilities Manager, Project Manager, Estimator, HVACR Instructor, HVACR Sustainable Technologies Technician, and/or a Union Business Agent/ Business Manager in almost any industry. Labor Market Analysis indicates increased employment opportunities in the Pipe Trades through 2020. Students earning an Associate in Science degree in Air Conditioning and Refrigeration Technology will increase their marketability and employment opportunities. Admission to apprenticeship classes is limited to apprentices registered with the California Department of Apprenticeships Standards, according to the California Labor Code, Section § 3074.3.

The apprenticeship program, which includes coursework, lab work and on-the-job training, involves learning about the assessment, installation, maintenance, and repair of different types of pipe systems, electronic control systems, refrigeration and air conditioning systems, effective and safe tool use, material applications, electrical competency, related mathematics & science and storage. The courses required for the Certificate of Achievement in Refrigeration and Air Conditioning Mechanical Service also meet many of the requirements for the Associate in Science degree in Air Conditioning and Refrigeration Technology.

Item 3. Program Requirements

Associate in Science Degree in Air Conditioning and Refrigeration Technology						
Requirements	**Dept. Name/#**	**Name**	**Units**	**CSU-GE**	**IGETC**	**Sequence**
Core Courses (45.5 Quarter Units)	APPT 151	Advanced Chillers and Refrigeration	4.5	NA	NA	Year 1, Fall & Winter
	APPT 152	Basic Electricity and Refrigeration	4.5	NA	NA	Year 1, Spring & Summer
	APPT 153	Mechanical Systems	4.5	NA	NA	Year 2, Fall & Winter
	APPT 154	Electrical Controls Fundamentals	4.5	NA	NA	Year 2, Spring & Summer
	APPT 155	Advanced Electric Controls	4.5	NA	NA	Year 3, Fall & Winter
	APPT 156	HVAC Pneumatic & Electric Controls	4.5	NA	NA	Year 3, Spring & Summer
	APPT 157	Industrial Refrigeration & Air-Conditioning Service	4.5	NA	NA	Year 4, Fall & Winter
	APPT 158	Advanced Refrigeration & Chillers	4.5	NA	NA	Year 4, Spring & Summer
	APPT 159	Start, Test, & Balance: HVAC Systems	4.5	NA	NA	Year 5, Fall & Winter
	APPT 129	Special Topics	2.5	NA	NA	Year 5, Spring & Summer
	APPT 130	Review and Turnout	2.5	NA	NA	Year 5, Spring & Summer

Required Major Total	**45.5 units**
Completion of Foothill GE pattern	35 units
Transferable electives (as needed to reach 60 units)	9.5 units
TOTAL UNITS	**90 units**

Proposed Sequence:

Year 1, Fall & Winter = 4.5 units
Year 1, Spring & Summer = 4.5 units
Year 2, Fall & Winter = 4.5 units
Year 2, Spring & Summer = 4.5 units
Year 3, Fall & Winter = 4.5 units
Year 3, Spring & Summer = 4.5 units
Year 4, Fall & Winter = 4.5 units
Year 4, Spring & Summer = 4.5 units
Year 5, Fall & Winter = 4.5 units
Year 5, Spring & Summer = 5.0 units
Year 6, Fall = 6 units
Year 6, Winter = 6 units
Year 6, Spring = 6units
Year 6, Summer = 6 units
Year 7, Fall = 6 units
Year 7, Winter = 6 units
Year 7, Spring = 6 units
Year 7, Summer = 3 Units
TOTAL UNITS: 90 units

Associate Degree Requirements:

- English proficiency: ENGL 1A, 1AH, 1S & 1T, ESLL 26 or equivalent.
- Mathematics proficiency: MATH 57, 105, 108 or equivalent.

A minimum of 90 units is required to include:

- All Foothill General Education requirements (35 Units)
- Core courses (47 Units)
- Electives (8 Units)

Labor Market Analysis: The occupational outlook for the Pipe Trades industry shows strong demand and growth over the next ten years in Santa Clara and San Benito counties. The projected employment of Heating, Air Conditioning, and Refrigeration journeymen is expected to grow by 29.8% in the period from 2010 to 2020. The California State Employment Development Department expects the number of professionals employed in the Pipe Trades to increase from 1,190 to 2,480. The Associate in Science degree in Air Conditioning and Refrigeration Technology is an important contribution in efforts to educate California's workforce and meet local demands for educated professionals in the Pipe Trades. More generally, the National Skills Coalition reported in November, 2007, that jobs in the middle of the labor market, "those that require more than high school, but less than a four-year degree" are in demand, and will remain "robust relative to its supply." See Appendix A for Santa Clara County Labor Market Information.

Advisory Committee Meeting Minutes and Member list: See Appendix B

Item 4. Master Planning

The Associate in Science degree in Air Conditioning and Refrigeration Technology aligns with the planned goals of the College and the District because the program serves the regional area in support of workforce development and economic growth. The Associate in Science degree in Air Conditioning and Refrigeration Technology is a new degree and does not duplicate an already-existing program within the Foothill-De Anza district or the surrounding colleges.

The only competition to the Associate in Science degree in Air Conditioning and Refrigeration Technology program at Foothill College occurs from two out-of-state colleges that offer on-line degrees. PTTC apprentices and recently-graduated journeymen are taking on-line courses at Washtenaw Community College and at National Labor College at considerably higher tuition, $194/credit hour and $297/credit hour respectively, and other expenses in order to earn an Associate in Applied Science degree in HVACR Sustainable Technologies or Industrial Journeyman. Offering an Associate in Science degree in Air Conditioning and Refrigeration Technology at Foothill College would well serve the college's primary stakeholders: the students, community partners, and the community at-large.

Local references in support of the Associate in Science degree in Air Conditioning and Refrigeration Technology include all Advisory Committee representatives from the PTTC (Appendix B) who strongly support the partnership between the PTTC and Foothill College due to their understanding of local economic workforce needs and their ongoing contact with apprenticeship students, which provides grounded understanding of their students' short-term and long-term educational goals.

Item 5. Enrollment and Completer Projections

		Year 1		Year 2	
Course #	**Course Title**	**Annual Sections**	**Annual Enrollment**	**Annual Sections**	**Annual Enrollment**
APPT 151	Advanced Refrigeration and Chillers	2	24	2	21
APPT 152	Basic Electricity and Refrigeration	2	23	2	22
APPT 153	Mechanical Systems	1	13	2	21
APPT 154	Electrical Controls Fundamentals	1	15	2	22
APPT 155	Advanced Electric Controls	1	6	1	14
APPT 156	HVAC Pneumatic and Electric Controls	1	6	1	14
APPT 157	Industrial Refrigeration and Air-Conditioning Service	2	19	1	6
APPT 158	Advanced Refrigeration and Chillers	2	19	1	7
APPT 159	Start, Test, & Balance: HVAC Systems	2	24	2	19
APPT 129	Special Topics	3	25	2	20
APPT 130	Review and Turnout	2	25	2	21

Item 6. Place of Program in Curriculum/Similar Programs

The Associate in Science degree in Air Conditioning and Refrigeration Technology does not adversely affect existing programs at Foothill College in terms of competition for students or courses, nor does it take material resources away from other existing programs at the College. The Associate in Science degree in Air Conditioning and Refrigeration Technology is designed to create pathways for students from Pre-Apprenticeship and Apprenticeship through an Associate's degree and potential transfer to a four-year institution. Thus, the students can easily move from the Certificate of Achievement in Refrigeration and Air Conditioning Mechanical Service to the Associate's degree in Air Conditioning and Refrigeration Technology. This streamlined approach facilitates the students' ability to readily complete their educational goals and to earn family-supporting wages.

Item 7. Similar Programs at Other Colleges in Service Area

There are no similar programs in existence in the college service area of Foothill College; the partnership with the Loyd E. Williams Pipe Trades Training Center is unique in the college service area.

Appendix A:

Labor Market Analysis

for Heating, Air Conditioning and Refrigeration Employment

for San Benito and Santa Clara Counties

from 2010 – 2020

Employment Development Department
Labor Market Information Division
January 7, 2013

2010-2020 Occupational Employment Projections
San Jose-Sunnyvale-Santa Clara
(San Benito and Santa Clara Counties)

SOC Code*	Occupational Title	Annual Average		Employment		Average Annual			2012 First Quarter		Education and Training		
		2010	2020	Numerical [1]	Percent	New Jobs [2]	Replace-ment Needs [3]	Total Jobs [4]	Median Hourly	Median Annual	Entry Level Education	Work Experience	On-the-Job Training
49-1000	Supervisors of Installation, Maintenance, and Repair Workers	1,980	2,330	350	17.7	35	52	87	N/A	N/A			
49-1011	First-Line Supervisors of Mechanics, Installers, and Repairers	1,980	2,330	350	17.7	35	52	87	$35.92	$74,710	7	1-5 years	None
49-2000	Electrical and Electronic Equipment Mechanics, Installers, and Repairers	5,640	6,520	880	15.6	91	121	212	N/A	N/A			
49-2011	Computer, Automated Teller, and Office Machine Repairers	1,860	2,040	180	9.7	19	46	65	$18.81	$39,126	5	None	None
49-2022	Telecommunications Equipment Installers and Repairers, Except Line Installers	1,930	2,380	450	23.3	45	31	76	$31.43	$65,357	5	None	MT OJT
49-2094	Electrical and Electronics Repairers, Commercial and Industrial Equipment	630	700	70	11.1	8	15	23	$30.56	$63,566	5	None	LT OJT
49-2098	Security and Fire Alarm Systems Installers	440	620	180	40.9	18	11	29	$24.77	$51,530	7	None	MT OJT
49-3000	Vehicle and Mobile Equipment Mechanics, Installers, and Repairers	6,050	7,380	1,330	22.0	133	154	287	N/A	N/A			
49-3011	Aircraft Mechanics and Service Technicians	300	360	60	20.0	6	9	15	$27.72	$57,665	5	None	None
49-3021	Automotive Body and Related Repairers	570	710	140	24.6	14	14	28	$22.59	$46,985	7	None	MT OJT
49-3023	Automotive Service Technicians and Mechanics	3,460	4,280	820	23.7	82	89	171	$23.22	$48,310	7	None	LT OJT
49-3031	Bus and Truck Mechanics and Diesel Engine Specialists	720	840	120	16.7	12	16	28	$24.83	$51,646	7	None	LT OJT
49-3042	Mobile Heavy Equipment Mechanics, Except Engines	340	400	60	17.7	6	9	15	$30.03	$62,461	7	None	LT OJT
49-3093	Tire Repairers and Changers	430	540	110	25.6	11	11	22	$14.29	$29,714	7	None	MT OJT
49-9000	Other Installation, Maintenance, and Repair Occupations	12,220	14,700	2,480	20.3	248	249	497	N/A	N/A			
49-9012	Control and Valve Installers and Repairers, Except Mechanical Door	120	130	10	8.3	1	2	3	$28.86	$60,029	7	None	MT OJT
49-9021	Heating, Air Conditioning, and Refrigeration Mechanics and Installers	1,520	2,150	630	41.5	63	27	90	$26.96	$56,093	5	None	LT OJT
49-9041	Industrial Machinery Mechanics	750	970	220	29.3	23	14	37	$30.87	$64,202	7	None	LT OJT
49-9043	Maintenance Workers, Machinery	180	190	10	5.6	1	3	4	$23.71	$49,309	7	None	MT OJT
49-9052	Telecommunications Line Installers and Repairers	750	830	80	10.7	8	14	22	$31.52	$65,561	7	None	LT OJT
49-9062	Medical Equipment Repairers	250	360	110	44.0	10	7	17	$26.07	$54,228	4	None	MT OJT
49-9071	Maintenance and Repair Workers, General	5,990	6,890	900	15.0	90	110	200	$22.07	$45,903	7	None	MT OJT
49-9094	Locksmiths and Safe Repairers	130	170	40	30.8	4	2	6	$31.83	$66,214	7	None	LT OJT
49-9098	Helpers--Installation, Maintenance, and Repair Workers	660	770	110	16.7	12	30	42	$15.35	$31,938	7	None	MT OJT
49-9799*	Installation, Maintenance, and Repair Workers, All Other	1,250	1,480	230	18.4	23	23	46	$26.80	$55,750	7	None	MT OJT