Air Conditioning PUR 2023-2024

Air Conditioning:

- Air Conditioning Technology PUR 2023-24 Self Study

SI Section Templates: 1.A. Program or Unit Description, 1.B. Program or Unit Mission, 1.C. Program Learning Outcomes, 2.A. Progress on Previous Findings and Recommendations, 2.B. Workforce Needs (AAS degrees and certificates, allied health programs only), 2.C. Accessibility and Cost of Instructional Materials, 2.D. Catalog Review, 3.A. Curriculum Mapping, 3.B. Evidence of Program Learning Outcomes Assessment, 3.C. General Education Outcomes Assessment (if applicable), 4.A. FTE and Section Count, 4.B. Course Fill Rates and Unsuccessful Enrollment Attempts, 4.C. Student Demographics: Ethnicity, Gender, Credit Load, Student Status, Age Range, Pell-eligibility, and First-generation status, 5.A. Course Completion Rates, 5.B. Graduation and Transfer, 6.A. Faculty Achievement, 6.B. FT/PT Faculty and Student Credit Hours Taught, 6.C. Support Staff, 6. D. Facilities and Technology, 7.A. Five-Year Plan, 8.A. Resource Requests, Academic Standards and Assessment Committee Findings and Recommendations, Dean's Findings and Recommendations, Vice President of Academic Affairs' Findings and Recommendations

Date: 09-11-2024

Sorted by: Section

1.A. Program or Unit Description

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Briefly describe (1 paragraph) the program/unit, including but not limited to the following: academic division that the program/unit belongs to, the academic area(s) represented, degrees/certificates offered, average student enrollment, number of full-time faculty, type of curriculum or pedagogical approaches, and any other pertinent aspect of the program/unit.

The HVAC/R program is housed in the Technical Science Division under Dean Kimberley Harrell. The degrees are as followed; Air Conditioning Technologies Climate Control Systems, AAS. Certificates of Achievements are; Air Conditioning Technology Climate Control systems, and Heating, Ventilation, Air Conditioning/Refrigeration (HVACR/R). Skill Certificates are Commercial Refrigeration; Climate Control Systems; and Heating, Ventilation, Air Conditioning/Refrigeration. The average enrollment of the accelerated program (required 30 credits) averages eight (8) students with the exception of 2023 which has sixteen (16) students. The night classes average closely to fourteen (14) students per class, with the exception of fall 2023 where two of the three classes offered filled to capacity. The HVAC/R program has one full time faculty member who's pedgagocial approach is that of a facilitator. The HVAC/R program focuses on service, troubleshooting, and sequence of operation of multiple types of equipment found in the local community dealing with HVAC/R.

1.B. Program or Unit Mission

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State the department's or unit's mission. Describe how it aligns to the College's Mission, and how program learning outcomes (PLOs) for degrees and certificates offered, or for the unit, align to the department/unit mission. If your department or unit does not currently have a mission statement, please discuss among your colleagues and develop one.

The program mission is to provide quality training for beginning to advanced students in Heating, Ventilation, Air-Conditioning, and Refrigeration to directly prepare them for the workforce. This directly aligns with the College's Mission to prepare students for industry jobs in Nevada. All PLOs align with workforce preparation in the HVAC/R industry.

1.C. Program Learning Outcomes

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Program Learning Outcomes (PSLOs or PLOs)
Air Conditioning
AAS Climate Control Systems (154)
PSLO 1: Incorporate workforce safety principles while performing basic tasks of a Heating, Ventilation, Air Conditioning, and Refrigeration (HVAC/R) technician. (Active from Spring 2021)
PSLO 2: Interpret electrical/mechanical schematics on HVAC/R equipment to diagnose mechanical or electrical problems in a residential or light commercial environment. (Active from Spring 2021)
PSLO 3: Appraise EPA rules, regulations, and refrigerant handling techniques in the performance of HVAC/R duties. (Active from Spring 2021)
PSLO 4: Diagnose and repair electrical or mechanical problems on commercial air conditioning equipment; critical systems; chillers. (Active from Spring 2021)
CoA Climate Control Systems (167)
PSLO 1: Incorporate workforce safety principals while performing basic tasks of a Heating, Ventilation, Air Conditioning, and Refrigeration (HVAC/R) technician. (Active from Spring 2021)

Program Learning Outcomes (PSLOs or PLOs)
PSLO 2: Interpret electrical/mechanical schematics on HVAC/R equipment to diagnose mechanical or electrical problems in a residential or light commercial environment. (Active from Spring 2021)
PSLO 3: Diagnose and repair electrical or mechanical problems on commercial air conditioning equipment; critical systems; chillers. (Active from Spring 2021)
CoA HVAC/R (39)
PSLO1: Incorporate workforce safety principles while performing basic tasks of a Heating, Ventilation, Air Conditioning, and Refrigeration (HVAC/R) technician. (Active from Fall 2010)
PSLO2: Interpret electrical/mechanical schematics on HVAC/R equipment to diagnose mechanical or electrical problems in a residential or light commercial environment. (Active from Fall 2010)
PSLO3: Diagnose and repair electrical or mechanical problems on commercial air conditioning equipment; critical systems; chillers. (Active from Fall 2010)
Commercial Refrigeration Skills Certificate (40)
PSLO 1: Identify, troubleshoot, and repair commercial refrigeration units. (Active from Spring 2021)
PSLO 2: Identify, explain, and apply design techniques to commercial Refrigeration systems. (Active from Spring 2021)
PSLO 3: Identify, explain, and apply service and repair techniques to commercial refrigeration systems. (Active from Spring 2021)
Climate Control Systems Skills Certificate (182)
PSLO 1: Incorporate workforce safety principals while performing basic tasks of a Heating, Ventilation, Air Conditioning, and Refrigeration (HVAC/R) technician. (Active from Spring 2021)
PSLO 2: Interpret electrical/mechanical schematics on HVAC/R equipment to diagnose mechanical or electrical problems in a residential or light commercial environment. (Active from Spring 2021)
PSLO 3: Diagnose and repair electrical or mechanical problems on commercial air conditioning equipment; critical systems; chillers. (Active from Spring 2021)
Heating, Ventilation, Air-Conditioning/Refrigeration (HVAC/R) Skill Certificate (43)
PSLO 1: Identify, explain, troubleshoot, repair electrical systems and controls in HVAC/R systems and controls. (Active from Spring 2021)
PSLO 2: Identify and apply the elements of design techniques in HVAC/R. (Active from Spring 2021)
PSLO 3: Identify, troubleshoot and repair HVAC/R. (Active from Spring 2021)

2.A. Progress on Previous Findings and Recommendations

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Describe your progress on the major findings and recommendations for the program/unit from the last PUR, any annual progress reports (APRs), and if applicable, external reviews, (e.g. advisory boards, articulation committees, and program accreditors).

- **Which findings and recommendations have the program/unit addressed?**
- **Which have yet to be accomplished? Which are no longer relevant, and why?**
- **Has the program/unit undergone any major changes as a result or that would impact the findings and recommendations since the last PUR?**

This is the first Air Conditioning PUR, it had previously been part of the Construction Technology PUR. Recommendations specific to Air Conditioning from the previous PUR centered around timely completion of course assessment and reporting. This has been addressed and all courses are formally assessed on the appropriate timeline. Additionally, all skills certificates, CoAs and the AAS PSLOs are reviewed and updated as needed.

The program has an active Advisory Board that meets once every semester. The Advisory Board is supportive of the program as it currently exists and has expressed that the program is well designed to meet workforce needs. A major change that came out of the Advisory Board was a swtich from Open Entry to Traditional which is discussed further below.

Program faculty attend job fairs regularly to increase community awareness and increase enrollment.

2.B. Workforce Needs (AAS degrees and certificates, allied health programs only)

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Describe how your program(s) are meeting workforce needs, especially in the northern Nevada region, by answering the accompanying questions. The following are potential resources for labor market data, though other sources may be referenced.

Nevada Department of Employment Training and Rehabilitation (DETR) (https://www.nevadaworkforce.com/Home/DS-Results-Projections2)
Nevada Governor's Office of Economic Development (GOED) Data Portal (https://goed.nv.gov/why-nevada/data-portal/)
U.S. Bureau of Labor Statistics (http://www.bls.gov/)

- **What is the evidence for the regional need for the program (DETR and EDAWN data)?**
- **What is the evidence that the program curriculum meets the**

latest industry trends or workforce needs?

- **What are advisory boards suggesting about workforce needs in your program area(s)?**

According to DETR, there is projected short term and long term job growth for heating, air conditioning, and refrigeration mechanics. Growth projections for 2022-2024 are 6.15%. Growth projections for 2020-2030 are 21.25%. This demonstrates a distinct need in Nevada for additional workers in the HVAC/R field and the Air Conditioning program allows for students to directly enter a growing workforce.

2.C. Accessibility and Cost of Instructional Materials

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- **What are faculty in the department/unit currently doing to help ensure that instructional materials are accessible to students with disabilities? Examples include attending Professional Development accessibility sessions, running accessibility checkers on materials, completing accessibility workshops, and working with publishers to ensure textbooks and materials are accessible.**
- **What are faculty in the department/unit currently doing to offer more affordable instructional materials to students. Examples include internal development of educational materials or utilization of low cost materials that our TMCC librarians are happy to assist you with finding (e.g. open educational resources (OER), archival materials, journal articles).**

Faculty currently work with the DRC on an as needed basis to ensure that any student with a need for accommodations receives those. At this time, the UDOIT accessibility checker in Canvas has not been run but will be in the future.

Faculty are currently evaluating OER options for the program for appropriateness. Currently one textbook is utilized in the majority of the courses, with the cost averaged out to roughly $25-30/course. Additional information is provided using the RSES on-line resource at no cost to students.

2.D. Catalog Review

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- **Is the program information in the catalog correct, including program descriptions, PLOs, course offerings, course descriptions, and semesters that courses are offered?**
- **Does the program's suggested course sequence in the catalog allow for completion of degrees within 2 years and/or certificates within 2 semesters for full-time students? Are there any hidden prerequisites?**
- **Excluding special topics courses, are there any courses that the department has not offered in 4 or more years? Please list them and indicate whether you plan to update and offer, or deactivate the(se) course(s) in the next academic year.**

Course offerings and sequences for the AAS, Skills Certificates, and CoAs are accurate and can be completed within the appropriate timeframes. There are no hidden pre-requisites. All courses have been offered within the last 4 years. The program description for the AAS will be updated to reflect both degree tracks within the year.

The catalog needs to be updated to reflect the program as Air Conditioning instead of Climate Control and/or HVAC/R to match the degree name as well as make the program more visible and explanatory to potential students and the community.

3.A. Curriculum Mapping

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- **PLOs: Do all PLOs reflect what you want students to demonstrate once they complete the program? Are there any PLOs that need to be updated? Are all PLOs measurable?**
- **Potential gaps and scaffolding: Are there any PLOs that are not addressed across the program curriculum? Are PLOs reflected in multiple courses in a way that scaffolds learning?**
- **CLO alignment: Is there a need to modify any course learning outcomes so that courses better support PLOs?**
- **Course sequencing: Is there a need to modify the course sequencing so that learning is scaffolded throughout the program? In other words, courses taken earlier in the program sequence should introduce PLOs, and courses taken later in the sequence should reinforce PLOs by offering students additional opportunities to practice.**
- **Curriculum and learning opportunities: Is it necessary to**

introduce new opportunities to reinforce learning? These could be modules or assignments in specific courses, additional courses, and/or co-curricular opportunities that would be required of all students in the program.

- **Do you need to make any changes to your curriculum map after this analysis?**

AAS Climate Control Systems Curriculum Map

Map Origin: AAS Climate Control Systems (154)
Map Target: AAS Climate Control Systems (154)

	AAS Climate Control Systems (154)			
CSLOs	PSLO 1: Incorporate workforce safety principles while performing basic tasks of a Heating, Ventilation, Air Conditioning, and Refrigeration (HVAC/R) technician.	PSLO 2: Interpret electrical/mechanical schematics on HVAC/R equipment to diagnose mechanical or electrical problems in a residential or light commercial environment.	PSLO 3: Appraise EPA rules, regulations, and refrigerant handling techniques in the performance of HVAC/R duties.	PSLO 4: Diagnose and repair electrical or mechanical problems on commercial air conditioning equipment; critical systems; chillers.
AC102	X		X	
1. Students will apply the laws of physics, including thermodynamics, to mechanical refrigeration systems.	X (PD)		X (PD)	
2. Students will demonstrate the operation of the mechanical refrigeration cycle, its components and their function.	X (PD)		X (PD)	
3. Students will develop common knowledge of the EPA guidelines section 608.	X (PD)		X (PD)	
AC107	X	X		X
1. Students will apply the operation and theory of Ohms Law to HVAC/R	X	X (PD)		X (PD)
2. Students will demonstrate the ability to add, subtract, multiply and divide whole numbers, common fractions and decimals.	X			
3. Students will formulate solutions to problems using critical thinking skills while working independently and/or in teams.	X			
4. Students will systematically diagnose problems and repair HVAC and safety control systems.	X	X (PD)		X (PD)
5. Students will wire and install HVAC control systems.	X (PD)	X (PD)		X (PD)
AC113		X		X
1. Students will analyze how HVAC/R systems are wired and illustrate the sequence of operation.		X (PD)		X (PD)
2. Students will demonstrate reading and identifying components of schematics found in HVAC/R		X (PD)		X (PD)
AC150	X		X	
1. Students will add, subtract, multiply and divide whole numbers, common fractions and decimal fractions.				
2. Students will select and use appropriate tools and equipment for assembly, troubleshooting, repair, and maintenance or refrigeration systems.	X (PD)			
3. Students will apply a systematic approach to troubleshooting, repair, and maintenance or refrigeration systems.			X (PD)	
4. Students will formulate solutions to problems using critical thinking skills while working independently and/or in teams.				
5. Students will illustrate the ability to systematically draw and assemble a refrigeration system.				
AC201	X			
1. Identify commercial HVAC equipment types.	X (PD)			
2. Explain the operation of multiple commercial HVAC system				
3. Describe the function of BAS (Building Automation System)	X (PD)			
AC205				
1. Students will demonstrate the ability to set up a BAS network	X (PD)			
2. Students will setup a basic ALC program				X (PD)
3. Students will learn troubleshooting techniques on a BAS (building automation system).		X (PD)		
AC206	X			X
1. Demonstrate the ability to navigate ALC system	X (PD)			
2. Demonstrate the ability to create equipment specific logic and graphics	X (PD)			
3. Perform troubleshooting techniques on live equipment in the TMCC commercial lab.	X (PD)			X (PD)
AC295	X	X	X	X
1. Individualized, specific learning outcomes will be written by the employer, student, and faculty member.				
2. Student will demonstrate the ability to practice effective work and employment skills.	X (PD)	X (PD)	X (PD)	X (PD)
3. Students will synthesize classroom knowledge and abilities with new practical application skills gained in the work site.	X (PD)			
IS101	X	X		X
1. Students will demonstrate the ability to analyze and report data using spreadsheet software	X (PD)			
2. Students will demonstrate the ability to perform basic maintenance, configuration and backup operations on a PC.		X (PD)		X (PD)
3. Students will demonstrate the ability to use word processing software to create a professional resume and format an academic research paper.				
OSH222	X			
1. Students will apply OSHA rules and regulations while developing safe work habits in an industrial environment.	X (PD)			
2. Students will demonstrate a positive personal safety attitude.				
	8	4	3	5

Attainment Levels:
M: Mastered
RM: Reinforced/Mastered
IR: Introduced/Reinforced
DM: Demonstrate/Mastery
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CoA Climate Control Systems Curriculum Map

Map Origin: CoA Climate Control Systems (167)
Map Target: CoA Climate Control Systems (167)

	CoA Climate Control Systems (167)		
CSLOs	PSLO 1: Incorporate workforce safety principals while performing basic tasks of a Heating, Ventilation, Air Conditioning, and Refrigeration (HVAC/R) technician.	PSLO 2: Interpret electrical/mechanical schematics on HVAC/R equipment to diagnose mechanical or electrical problems in a residential or light commercial environment.	PSLO 3: Diagnose and repair electrical or mechanical problems on commercial air conditioning equipment; critical systems; chillers.
AC102			
1. Students will apply the laws of physics, including thermodynamics, to mechanical refrigeration systems.			
2. Students will demonstrate the operation of the mechanical refrigeration cycle, its components and their function.			
3. Students will develop common knowledge of the EPA guidelines section 608.			
AC107			
1. Students will apply the operation and theory of Ohms Law to HVAC/R			
2. Students will demonstrate the ability to add, subtract, multiply and divide whole numbers, common fractions and decimals.			
3. Students will formulate solutions to problems using critical thinking skills while working independently and/or in teams.			
4. Students will systematically diagnose problems and repair HVAC and safety control systems.			
5. Students will wire and install HVAC control systems.			
AC150			
1. Students will add, subtract, multiply and divide whole numbers, common fractions and decimal fractions.			
2. Students will select and use appropriate tools and equipment for assembly, troubleshooting, repair, and maintenance or refrigeration systems.			
3. Students will apply a systematic approach to troubleshooting, repair, and maintenance or refrigeration systems.			
4. Students will formulate solutions to problems using critical thinking skills while working independently and/or in teams.			
5. Students will illustrate the ability to systematically draw and assemble a refrigeration system.			
AC201			
1. Identify commercial HVAC equipment types			
2. Explain the operation of multiple commercial HVAC system			
3. Describe the function of BAS (Building Automation System)			
AC205			
1. Students will demonstrate the ability to set up a BAS network			
2. Students will setup a basic ALC program			
3. Students will learn troubleshooting techniques on a BAS (building automation system).			
AC206			
1. Demonstrate the ability to navigate ALC system			
2. Demonstrate the ability to create equipment specific logic and graphics			
3. Perform troubleshooting techniques on live equipment in the TMCC commercial lab			
IS101			
1. Students will demonstrate the ability to analyze and report data using spreadsheet software			
2. Students will demonstrate the ability to perform basic maintenance, configuration and backup operations on a PC.			
3. Students will demonstrate the ability to use word processing software to create a professional resume and format an academic research paper.			
OSH222			
1. Students will apply OSHA rules and regulations while developing safe work habits in an industrial environment.			
2. Students will demonstrate a positive personal safety attitude.			
	0	0	0

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CoA HVAC/R Curriculum Map

Map Origin: CoA HVAC/R (39)
Map Target: CoA HVAC/R (39)

	CoA HVAC/R (39)		
CSLOs	PSLO1: Incorporate workforce safety principles while performing basic tasks of a Heating, Ventilation, Air Conditioning, and Refrigeration (HVAC/R) technician.	PSLO2: Interpret electrical/mechanical schematics on HVAC/R equipment to diagnose mechanical or electrical problems in a residential or light commercial environment.	PSLO3: Diagnose and repair electrical or mechanical problems on commercial air conditioning equipment; critical systems; chillers.
AC102			
1. Students will apply the laws of physics, including thermodynamics, to mechanical refrigeration systems.	X (PD)		
2. Students will demonstrate the operation of the mechanical refrigeration cycle, its components and their function.	X (PD)		
3. Students will develop common knowledge of the EPA guidelines section 608.	X (PD)		
AC106			
1. Students will apply mathematical concepts including converting between metric and standard units of measure to solve technical problems.			
2. Students will apply sequence of operation techniques to specific HVAC problems.	X (PD)		
3. Students will identify air-conditioning and heating cycles and their role in creating human comfort.	X (PD)		X (PD)
4. Students will troubleshoot air-conditioning and heating system components.	X (PD)		X (PD)
5. Students will troubleshoot low voltage controls used in refrigeration and heating systems.	X (PD)		X (PD)
AC107			
1. Students will apply the operation and theory of Ohms Law to HVAC/R	X (PD)		
2. Students will demonstrate the ability to add, subtract, multiply and divide whole numbers, common fractions and decimals.			
3. Students will formulate solutions to problems using critical thinking skills while working independently and/or in teams.			
4. Students will systematically diagnose problems and repair HVAC and safety control systems.	X (PD)		X (PD)
5. Students will wire and install HVAC control systems.	X (PD)		X (PD)
AC108			
1. Students will demonstrate knowledge of different types of single-phase and three phase motors used in HVACR			
2. Students will develop their knowledge of Electronically Commutated Motors (ECM) found in HVACR.			
3. Students will develop their ability to systematically diagnose problems found associated with motors used in HVACR.			
4. Students will identify the use of Electronically Commutated Motors (ECM) as required for efficiency standpoint.			
AC113			
1. Students will analyze how HVAC/R systems are wired and illustrate the sequence of operation.			
2. Students will demonstrate reading and identifying components of schematics found in HVAC/R			
AC150			
1. Students will add, subtract, multiply and divide whole numbers, common fractions and decimal fractions.			
2. Students will select and use appropriate tools and equipment for assembly, troubleshooting, repair, and maintenance or refrigeration systems.	X (PD)		X (PD)
3. Students will apply a systematic approach to troubleshooting, repair, and maintenance or refrigeration systems.			X (PD)
4. Students will formulate solutions to problems using critical thinking skills while working independently and/or in teams.			
5. Students will illustrate the ability to systematically draw and assemble a refrigeration system.			X (PD)
AC200			
1. Students will add, subtract, multiply and divide whole numbers, common fractions and decimal fractions, use units correctly and convert between metric and standard units of measure to solve technical problems.			
2. Students will formulate solutions to problems using critical thinking skills while working independently and/or in teams.			
3. Students will identify different types of commercial refrigeration units.	X (PD)		
4. Students will utilize multiple modes of communication during class, lab and during group projects/presentations, to enhance effectiveness in the workplace.			
AC210			
1. Students will demonstrate an operational understanding of the principles, components and controls of different types of boilers.	X (PD)		
2. Students will demonstrate an operational understanding of the safe operation of boiler systems.	X (PD)		
OSH222			
1. Students will apply OSHA rules and regulations while developing safe work habits in an industrial environment.			
2. Students will demonstrate a positive personal safety attitude.			
	0	0	0

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Climate Control Systems Skills Certificate Curriculum Map

Map Target: Climate Control Systems Skills Certificate (182)

CSLOs	Climate Control Systems Skills Certificate (182)		
	PSLO 1: Incorporate workforce safety principals while performing basic tasks of a Heating, Ventilation, Air Conditioning, and Refrigeration (HVAC/R) technician.	PSLO 2: Interpret electrical/mechanical schematics on HVAC/R equipment to diagnose mechanical or electrical problems in a residential or light commercial environment.	PSLO 3: Diagnose and repair electrical or mechanical problems on commercial air conditioning equipment; critical systems; chillers.
AC107			
1. Students will apply the operation and theory of Ohms Law to HVAC/R	X (IPD)		
2. Students will demonstrate the ability to add, subtract, multiply and divide whole numbers, common fractions and decimals.			
3. Students will formulate solutions to problems using critical thinking skills while working independently and/or in teams.			
4. Students will systematically diagnose problems and repair HVAC and safety control systems.			X (IPD)
5. Students will wire and install HVAC control systems.			X (IPD)
AC108			
1. Students will demonstrate knowledge of different types of single-phase and three phase motors used in HVACR			
2. Students will develop their knowledge of Electronically Commutated Motors (ECM) found in HVACR.			
3. Students will develop their ability to systematically diagnose problems found associated with motors used in HVACR.			
4. Students will identify the use of Electronically Commutated Motors (ECM) as required for efficiency standpoint.			
AC113			
1. Students will analyze how HVAC/R systems are wired and illustrate the sequence of operation.			
2. Students will demonstrate reading and identifying components of schematics found in HVAC/R			
AC201			
1. Identify commercial HVAC equipment types			X (IPD)
2. Explain the operation of multiple commercial HVAC system			X (IPD)
3. Describe the function of BAS (Building Automation System)			X (IPD)
AC205			
1. Students will demonstrate the ability to set up a BAS network	X (IPD)		
2. Students will setup a basic ALC program	X (IPD)		
3. Students will learn troubleshooting techniques on a BAS (building automation system).			X (IPD)
AC206			
1. Demonstrate the ability to navigate ALC system			X (IPD)
2. Demonstrate the ability to create equipment specific logic and graphics			X (IPD)
3. Perform troubleshooting techniques on live equipment in the TMCC commercial lab			X (IPD)
	0	0	0

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Skills Certificate (HVAC/R) Curriculum Map

Map Origin: Heating, Ventilation, Air-Conditioning/Refrigeration (HVAC/R) Skill Certificate (43)
Map Target: Heating, Ventilation, Air-Conditioning/Refrigeration (HVAC/R) Skill Certificate (43)

	Heating, Ventilation, Air-Conditioning/Refrigeration (HVAC/R) Skill Certificate (43)		
CSLOs	PSLO 1: Identify, explain, troubleshoot, repair electrical systems and controls in HVAC/R systems and controls.	PSLO 2: Identify and apply the elements of design techniques in HVAC/R.	PSLO 3: Identify, troubleshoot and repair HVAC/R.
AC102			
1. Students will apply the laws of physics, including thermodynamics, to mechanical refrigeration systems.			X (IPD)
2. Students will demonstrate the operation of the mechanical refrigeration cycle, its components and their function.		X (IPD)	X (IPD)
3. Students will develop common knowledge of the EPA guidelines section 608.			
AC106			
1. Students will apply mathematical concepts including converting between metric and standard units of measure to solve technical problems.			
2. Students will apply sequence of operation techniques to specific HVAC problems.	X (IPD)	X (IPD)	
3. Students will identify air-conditioning and heating cycles and their role in creating human comfort.			
4. Students will troubleshoot air-conditioning and heating system components.			X (IPD)
5. Students will troubleshoot low voltage controls used in refrigeration and heating systems.	X (IPD)	X (IPD)	X (IPD)
AC107			
1. Students will apply the operation and theory of Ohms Law to HVAC/R			
2. Students will demonstrate the ability to add, subtract, multiply and divide whole numbers, common fractions and decimals.			
3. Students will formulate solutions to problems using critical thinking skills while working independently and/or in teams.			
4. Students will systematically diagnose problems and repair HVAC and safety control systems.	X (IPD)		
5. Students will wire and install HVAC control systems.			X (IPD)
AC113			
1. Students will analyze how HVAC/R systems are wired and illustrate the sequence of operation.		X (IPD)	
2. Students will demonstrate reading and identifying components of schematics found in HVAC/R	X (IPD)		
AC150			
1. Students will add, subtract, multiply and divide whole numbers, common fractions and decimal fractions.			
2. Students will select and use appropriate tools and equipment for assembly, troubleshooting, repair, and maintenance or refrigeration systems.			
3. Students will apply a systematic approach to troubleshooting, repair, and maintenance or refrigeration systems.			X (IPD)
4. Students will formulate solutions to problems using critical thinking skills while working independently and/or in teams.			
5. Students will illustrate the ability to systematically draw and assemble a refrigeration system.	X (IPD)		
	0	0	0

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P: Practiced
R: Reinforced
I: Introduced

PSLO4 for AAS Climate Control Systems needs to be updated to reflect program outcomes. The workflow in CIM has begun.
PSLO3 for CoA Climate Control Systems needs to be updated to reflect program outcomes. The workflow in CIM has begun. The curriculum map needs to be updated to show alignment of the CSLOs to PSLOs.
PSLO3 for COA HVAC/R from 2010 needs to be updated to reflect program outcomes. The workflow in CIM has begun. The curriculum map needs to be updated to show scaffolding of learning and appropriate PSLO alignment.
PSLO3 for Skills Certificate needs to be updated to reflect program outcomes. The workflow in CIM has begun. The curriculum map needs to be updated to show PSLO achievement.
All other PSLOs have been evaluated and deemed appropriate for expected student learning at the programmatic level and are assessable.
All CSLOs have been evaluated and deemed appropriate
The curriculum maps that have been completed show scaffolding of learning and how the different courses feed directly into the PSLOs. Remaining curriculum mapping will be completed by end of Spring 2024.

3.B. Evidence of Program Learning Outcomes Assessment

Air Conditioning

Air Conditioning Technology PUR 2023-24 Self Study

Summarize the most significant program assessment results since your last PUR. These will come from past CARS, APRs, and Action Plans and assessment data within eLumen. Please discuss course assessment findings as they apply to the program and program learning outcomes.

PSLOs 1 and 3 for the AAS Climate Control Systems were assessed using AC 102. Based on the Spring 2020 assessment additional video content was added; AC 102 was then reassessed in Spring 2022 and there was a large increase in student learning with all students either meeting or exceeding expectations. Following this success with AC 102, similar changes were made throughout the program curriculum leading to increased student success at the program level.

PSLOs 2 and 4 for the AAS Climate Control Systems were assessed using AC 113 in Spring 2020. This assessment showed that students were struggling with wiring and the number of wiring exercises in lab was increased. This has led to increased student success in the course as well as the program.

Indirect assessment from the Advisory Board indicated that Open Entry was not successful in that students were not showing initiative or a high level of technical skills. The Advisory Board also expressed concern that the name of the program (at the time it was Critical Systems) may have lessened enrollment due to confusion as to what the program was offering.

Describe how department faculty implemented plans to improve students' achievement of program learning outcomes. What changes did you make to the program based on assessment results and improvement plans?

Changing the teaching concept of 80% lab and 20% book to 90% lab and 10% book showed a significant increase of understanding throughout the program. In AC 102 more videos were introduce with an increase of successful completion and understanding. This reflects understanding of PSLOs 1 and 3 of the AAS Degree.

Similar changes were made throughout the curriculum including in AC 113 to address PSLOs 2 and 4 of the AAS Degree.

All Skills Certificates and Certificates of Achievement require either AC 102 or AC 113 (or both) and the implemented changes have led to increased student success in these areas also.

Based upon Advisory Board feedback, upon return from COVID protocol the program changed from Open Entry back to Traditional Enrollment. The Advisory Board has since noted that graduates are performing at a higher level in the workforce.

Based on the Advisory Board concern about the name of the program, I changed the program name from Critical Systems to Air Conditioning Technology. Along with this current flyers including technology, job opportunities, salary potential, and program costs were made and distributed at career days, job fairs, and dedicated company tours. This has allowed the community to locate what is offered at TMCC and feedback from the Advisory Board has been favorable.

3.C. General Education Outcomes Assessment (if applicable)

Air Conditioning

Air Conditioning Technology PUR 2023-24 Self Study

- **Describe which general education learning outcomes (GELOs) you assessed in your department/unit and summarize the most significant assessment results.**
- **Describe how department faculty implemented plans to improve students' achievement of GE learning outcomes. What changes did you make to general education based on assessment results and improvement plans? Do any CLOs need to be changed to align with GELOs?**

N/A

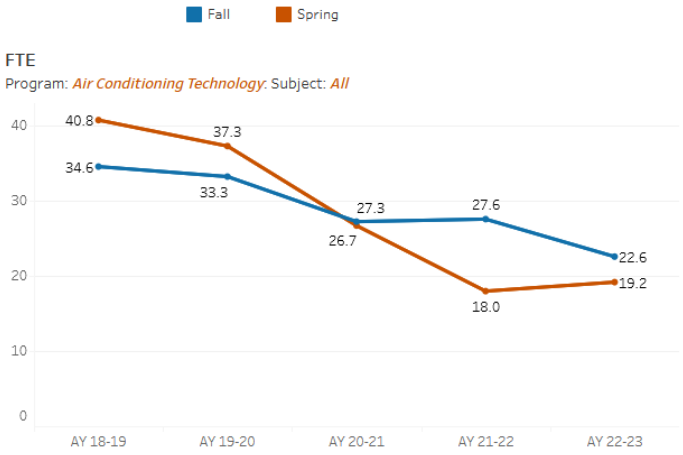
4.A. FTE and Section Count

Air Conditioning

Air Conditioning Technology PUR 2023-24 Self Study

FTE and Section Count

Program: Air Conditioning Technology | Subject: AC | Level: By Term | Term: (All)

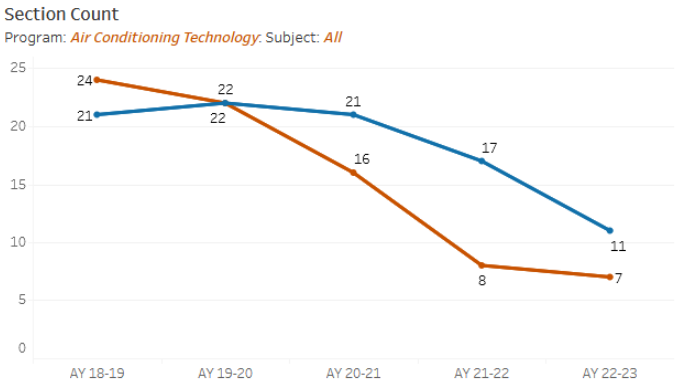


5 Year Change in FTE

	Fall	Spring
AC	-35%	-53%

Division	Fall	Spring
Business and Social Sciences	-9%	-12%
Division of Computer, Math & Physical Sci..	-10%	-14%
Liberal Arts	-19%	-19%
Life Sciences, Allied Health & Public Safety	-5%	-4%
Technical Sciences	22%	10%
TMCC	-8%	-10%

5 Year Change in Section Count



5 Year Change in Section Count

	Fall	Spring
AC	-48%	-71%

Division	Fall	Spring
Business and Social Sciences	-9%	-11%
Division of Computer, Math & Physical Scie..	-30%	-32%
Liberal Arts	-19%	-22%
Life Sciences, Allied Health & Public Safety	4%	2%
Technical Sciences	35%	10%
TMCC	-7%	-13%

Please analyze the trends in FTE and course section counts by academic year and by term. Discuss what these trends suggest about the viability of the program based on its enrollment.

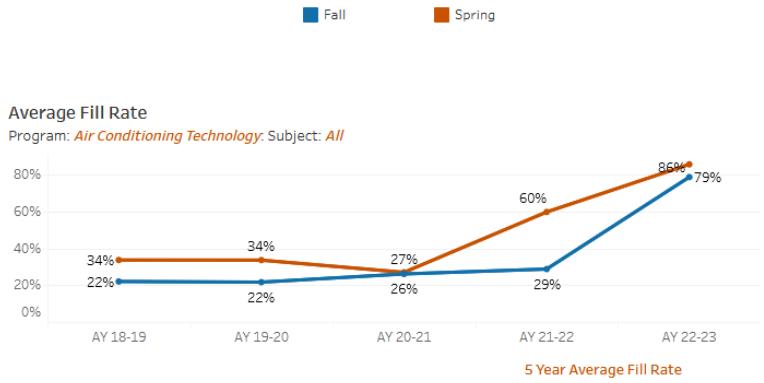
The FTE and section count trends show a significant decrease beginning in annual year 2019/2020 which corresponds with COVID. Both seem to be stabilizing but are low by the data shown. At this time there was a name change, rebranding, and switching from Open Entry to Traditional Enrollment which would have contributed to the trends. We will continue to monitor the FTE and Section count trends now that the changes have been made, and have noticed that in Fall 2023 both FTE and section count have roughly doubled. At this time the program is at or above pre pandemic levels in both FTE and section counts (there has been a 44% increase in enrollment from Fall 2022 to Fall 2023). Based upon this most recent data point, successful job placement, and demonstrated need for graduates the program is viable.

4.B. Course Fill Rates and Unsuccessful Enrollment Attempts

Air Conditioning

Air Conditioning Technology PUR 2023-24 Self Study

Program: Air Conditioning Technology | Subject: AC | Level: By Term



5 Year Average Fill Rate

	Fall	Spring
AC	31%	40%

Division	Fall	Spring
Business and Social Sciences	69%	63%
Division of Computer, Math & Physical Sci..	84%	79%
Liberal Arts	82%	76%
Life Sciences, Allied Health & Public Safety	79%	76%
Technical Sciences	45%	43%
TMCC	72%	68%

5 Yr Avg Course Level Fill Rate

Program: *Air Conditioning Technology*; Subject: *All*

	Fall	Spring
AC 102	45%	34%
AC 106	11%	34%
AC 107	44%	57%
AC 108	100%	
AC 111	17%	40%
AC 113	22%	37%
AC 121	40%	
AC 150	35%	35%
AC 198		51%
AC 200	4%	43%
AC 201	56%	81%
AC 204	3%	9%
AC 205	70%	59%
AC 210	11%	56%
AC 220	5%	5%
AC 295		27%

Unsuccessful Enrollment Attempts

Program: Air Conditioning Technology | Subject: AC

5 Yr Average Unsuccessful Enrollment Attempts

An enrollment attempt is considered unsuccessful if the student tried to enroll in one or more sections of a course but could not because the section was full, and who ultimately did not take the course that term. If they eventually enrolled in another section, they are not counted as unsuccessful. And a student is only counted once per course no matter how many section-level attempts they had.

Course Level

Program: Air Conditioning Technology

AC 107	3.00
AC 111	1.00
AC 210	1.50

Division & College Wide

Business and Social Sciences	4.08
Division of Computer, Math & Physical Sciences	18.00
Liberal Arts	8.99
Life Sciences, Allied Health & Public Safety	7.01
Technical Sciences	2.96
TMCC	7.53

Please analyze the trends in course fill rates and unsuccessful enrollment attempts. Discuss what these trends suggest about meeting student demand for the courses offered in your program (s).

The switch from Open Entry to Traditional Enrollment shows an expected increase in course fill rate. Course fill rates exceed those of the Technical Sciences Division and TMCC as a whole. The unsucessful enrollment attempts are very low (3 or below), suggesting that student demand for courses is being met.

4.C. Student Demographics: Ethnicity, Gender, Credit Load, Student Status, Age Range, Pell-eligibility, and First-generation status

Air Conditioning

Air Conditioning Technology PUR 2023-24 Self Study

Demographics: Program Majors

Program: Air Conditioning Technology

This section shows the demographics of the students who are declared majors in your program.

Headcount of Program Majors
Program: *Air Conditioning Technology*

Major	Fall 18	Fall 22	5 Yr Change
AC-AAS	0	2	
AC-CT	0	4	
CSCT-AAS	1	0	
CSCT-CT	0	0	
HAR-AAS	1	0	
HVACR-AAS	30	6	-80%
HVACR-CT	19	13	-32%

TMCC Headcount

Institution	Fall 18	Fall 22	5 Yr Change
TMCC	11,271	10,082	-11%

Term: Fall

Demographics: by Ethnicity

Program Majors by Ethnicity
Term: *Fall* Program: *Air Conditioning Technology*

Program: 2.0% – 68.6%

	Fall 18	Fall 19	Fall 20	Fall 21	Fall 22
American Indian	3.9%	2.1%	6.7%	3.2%	
Asian		4.3%	6.7%	9.7%	4.0%
Black	2.0%	4.3%	2.2%		8.0%
Hispanic	17.6%	36.2%	35.6%	35.5%	44.0%
Caucasian	68.6%	53.2%	46.7%	45.2%	40.0%
Two or more races	2.0%		2.2%		
Unknown	5.9%			6.5%	4.0%

TMCC by Ethnicity

Term: *Fall*

TMCC: 0.0% – 54.1%

	Fall 18	Fall 19	Fall 20	Fall 21	Fall 22
International	0.4%	0.3%	0.4%	0.5%	0.5%
American Indian	1.3%	1.0%	1.0%	1.3%	1.1%
Asian	5.9%	5.8%	6.5%	6.1%	6.6%
Black	2.6%	2.8%	2.8%	2.5%	2.4%
Hawaiian or Pacific Islander	0.0%	0.1%	0.1%	0.1%	0.3%
Hispanic	29.9%	32.3%	31.1%	33.6%	34.2%
Caucasian	54.1%	51.7%	51.5%	49.6%	48.3%
Two or more races	3.7%	4.2%	4.7%	4.3%	5.0%
Unknown	1.9%	1.7%	1.9%	2.1%	1.6%

Program Majors by Gender

Term: *Fall* Program: *Air Conditioning Technology.*

Program: 2.2% – 100.0%

	Fall 18	Fall 19	Fall 20	Fall 21	Fall 22
F			2.2%	3.2%	12.0%
M	100.0%	100.0%	97.8%	96.8%	88.0%

TMCC by Gender

Term: *Fall*

TMCC: 0.4% – 56.9%

	Fall 18	Fall 19	Fall 20	Fall 21	Fall 22
F	53.3%	54.3%	56.9%	55.1%	54.0%
M	46.3%	45.7%	43.1%	44.9%	46.0%
U	0.4%				

Program Majors by Student Status

Term: *Fall* Program: *Air Conditioning Technology.*

Program: 4.3% – 76.6%

	Fall 18	Fall 19	Fall 20	Fall 21	Fall 22
New	11.8%	19.1%	20.0%	32.3%	40.0%
Continuing	70.6%	76.6%	68.9%	61.3%	48.0%
New Transfer	17.6%	4.3%	11.1%	6.5%	12.0%

TMCC by Student Status

Term: *Fall*

TMCC: 2.6% – 65.5%

	Fall 18	Fall 19	Fall 20	Fall 21	Fall 22
New	15.2%	14.6%	13.5%	16.3%	17.2%
Continuing	65.5%	62.1%	60.9%	61.0%	57.2%
New Transfer	11.0%	8.7%	7.8%	8.1%	7.3%
New High School	5.7%	11.1%	12.4%	8.3%	12.0%
Continuing HS	2.6%	3.5%	5.4%	6.4%	6.4%

Program Majors by Age Range

Term: *Fall* Program: *Air Conditioning Technology*

Program: 3.2% – 51.6%

	Fall 18	Fall 19	Fall 20	Fall 21	Fall 22
18-24	37.3%	36.2%	33.3%	51.6%	48.0%
25-34	29.4%	29.8%	42.2%	35.5%	28.0%
35-49	25.5%	19.1%	17.8%	9.7%	16.0%
50+	7.8%	14.9%	6.7%	3.2%	8.0%

TMCC by Age Range

Term: *Fall*

TMCC: 2.4% – 54.6%

	Fall 18	Fall 19	Fall 20	Fall 21	Fall 22
<18	7.1%	12.7%	15.0%	11.8%	13.6%
18-24	54.6%	52.9%	51.4%	52.8%	52.2%
25-34	23.9%	22.2%	22.8%	23.6%	21.4%
35-49	10.5%	9.0%	8.4%	9.3%	9.8%
50+	3.9%	3.3%	2.4%	2.5%	3.0%

Term: Fall

Demographics: by Pell Eligibility

Program Majors by Pell Eligibility

Term: *Fall* Program: *Air Conditioning Technology*

Program: 33.3% – 66.7%

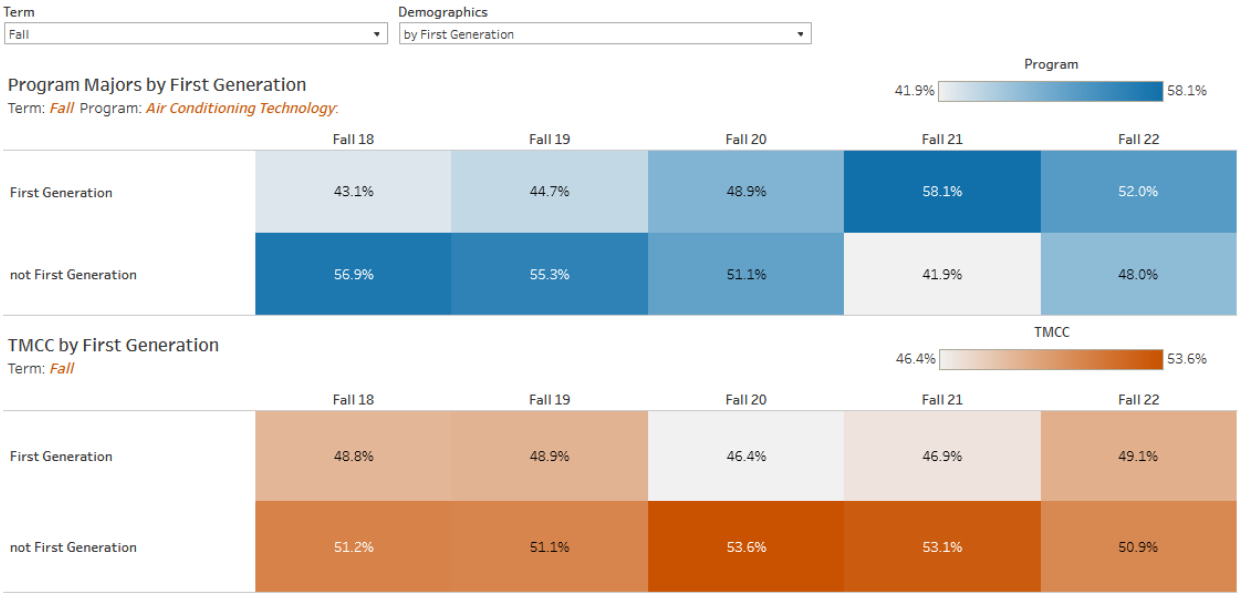
	Fall 18	Fall 19	Fall 20	Fall 21	Fall 22
Pell eligible	49.0%	57.4%	66.7%	35.5%	40.0%
not Pell Eligible	51.0%	42.6%	33.3%	64.5%	60.0%

TMCC by Pell Eligibility

Term: *Fall*

TMCC: 34.0% – 66.0%

	Fall 18	Fall 19	Fall 20	Fall 21	Fall 22
Pell eligible	44.1%	40.9%	39.9%	38.6%	34.0%
not Pell Eligible	55.9%	59.1%	60.1%	61.4%	66.0%



- **Briefly describe the typical student in terms of ethnicity, gender, credit load, student status, first-generation students, age range, Pell-eligibility and first-generation status, including how they compare to demographics of the college. Please note any potential equity gap and discuss your plans for closing them. An equity gap is where there is a significant and persistent disparity in access or achievement between different groups of students.**
- **Describe the demographics of the program's faculty compared to the demographics of the program's students.**
- **Discuss teaching methods and other practices used by the program's faculty to cultivate a welcoming, safe, and inclusive learning environment.**

The average student demographic are males that are either Hispanic or Caucasian with a roughly equal distribution between the two. Hispanic student enrollment is higher than that of TMCC as a whole by almost 10%. This matches the workforce demographic.

Students in the accelerated program average betwee 15-18 credits per semester whereas, students taking the program courses as night offerings average 3-6 credits per semester.

Continuing students from the fall to spring semester are the majority of students with an 82% continuing student population. This is higher than TMCC as a whole.

Most students fall in the 18-24 years of age category which is in line with TMCC. The program does have more 25-34 year-old students than the TMCC population.

The majority of students are not-Pell eligible, however there are 6% more Pell-eligible students than TMCC.

In the Spring 2023 roughly 74% of students were first-generation students. This is significantly higher than TMCC as a whole.

There is a known and noted gender equity gap in enrollment. Air Conditioning is a traditionally male dominated field. Women building women is no longer offered. Recruiting efforts are targetted towards all, efforts to target women specifically is challenging. There was an increase in female identifing students in the last school year (up to four females were enrolled and all but one was successful). There has been a significant increase in female students with an increase from 2% to 8% in the last two years. This may be a result of successful female program graduates that are in the community and representing that females are welcome in the field.

The full time faculty member is a Caucasian male which is representative of a significant proportion of the student population and the workforce population. The two part-time faculty are also Caucasian males.

The full-time faculty member's teaching style is that of a facilitator. This helps students to be relaxed while learning and class participation is high which relfects student comfort. This also generates an inclusive environment where students are unafraid to participate and as such have a high succes rate (discussed more below). Students are provided with real-world AC equipment for hands-on experiential learning leading to a high completion rate (discussed below).

5.A. Course Completion Rates

Air Conditioning

Air Conditioning Technology PUR 2023-24 Self Study

Program: Air Conditioning Technology | Subject: AC | Level: By Term

The tables below show the percent of students completing your courses. These numbers are compared to all divisions and to TMCC as a whole. The metrics can be disaggregated by the demographics below.

Completion Rate: The number of students who remain in a class until the end of the semester and receive A, B, C, D, Pass (P), Satisfactory (S), In Progress (X), Incomplete (I) or Audit (AD) grade notations.
Successful Completion: The number of students who completed a course with a C or better (A, B, C).

Gender: (All) | Ethnicity: (All) | Credit Load: (All) | Age Range: (All) | Student Status: (All) | First Generation: (All) | Pell Eligible: (All)

Avg Completion & Successful Completion Rates by Subject

Program: *Air Conditioning Technology* Subject: *AC*

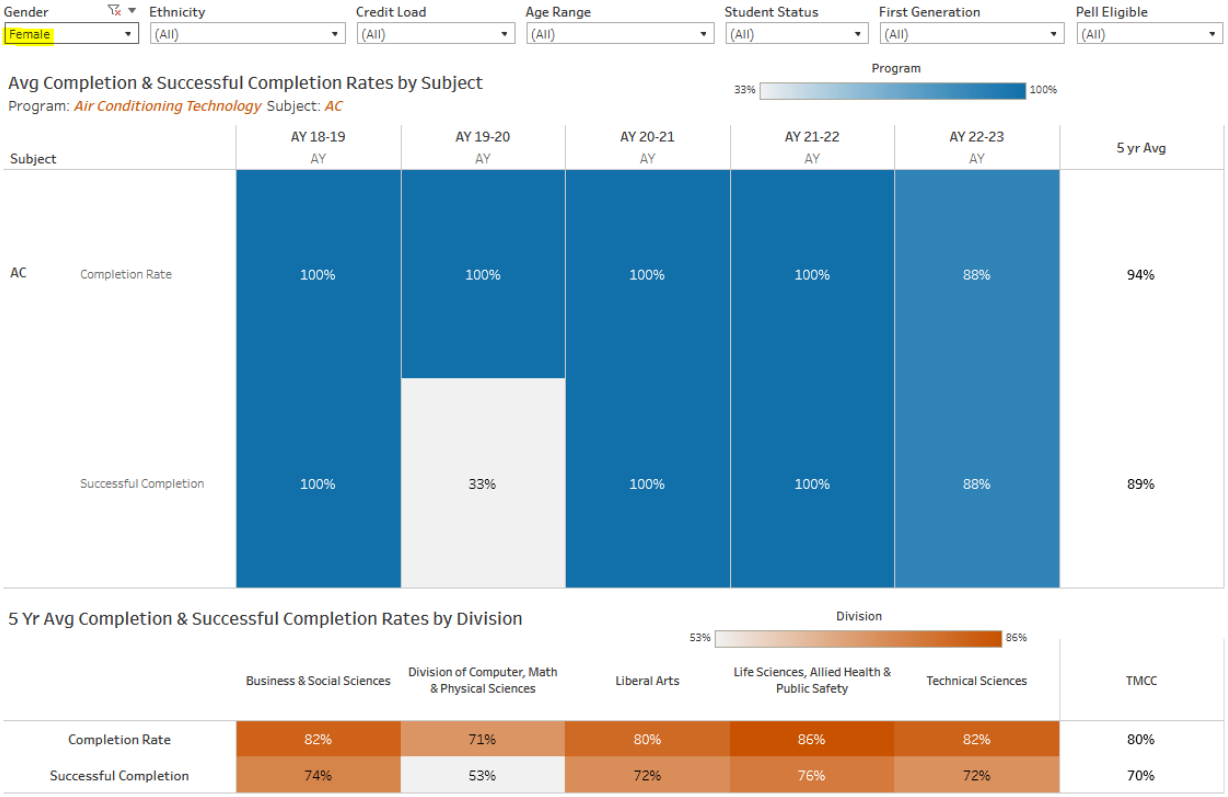
Program: 44% – 97%

Subject		AY 18-19 Fall	AY 18-19 Spring	AY 19-20 Fall	AY 19-20 Spring	AY 20-21 Fall	AY 20-21 Spring	AY 21-22 Fall	AY 21-22 Spring	AY 22-23 Fall	AY 22-23 Spring	5 yr Avg
AC	Completion Rate	92%	83%	89%	97%	75%	86%	83%	94%	81%	86%	87%
	Successful Completion	91%	76%	83%	44%	71%	81%	80%	86%	77%	83%	76%

5 Yr Avg Completion & Successful Completion Rates by Division

Division: 54% – 85%

	Business & Social Sciences	Division of Computer, Math & Physical Sciences	Liberal Arts	Life Sciences, Allied Health & Public Safety	Technical Sciences	TMCC
Completion Rate	81%	71%	78%	85%	84%	79%
Successful Completion	73%	54%	70%	76%	74%	69%



Please discuss any trends or shifts that you see in the overall course completion rate, and successful completion (C or better). What might these trends or shifts mean?

Next, disaggregate the data by student demographics. Discuss any potential equity gaps and your plans for closing these gaps. An equity gap is where there is a significant and persistent disparity in access or achievement between different groups of students.

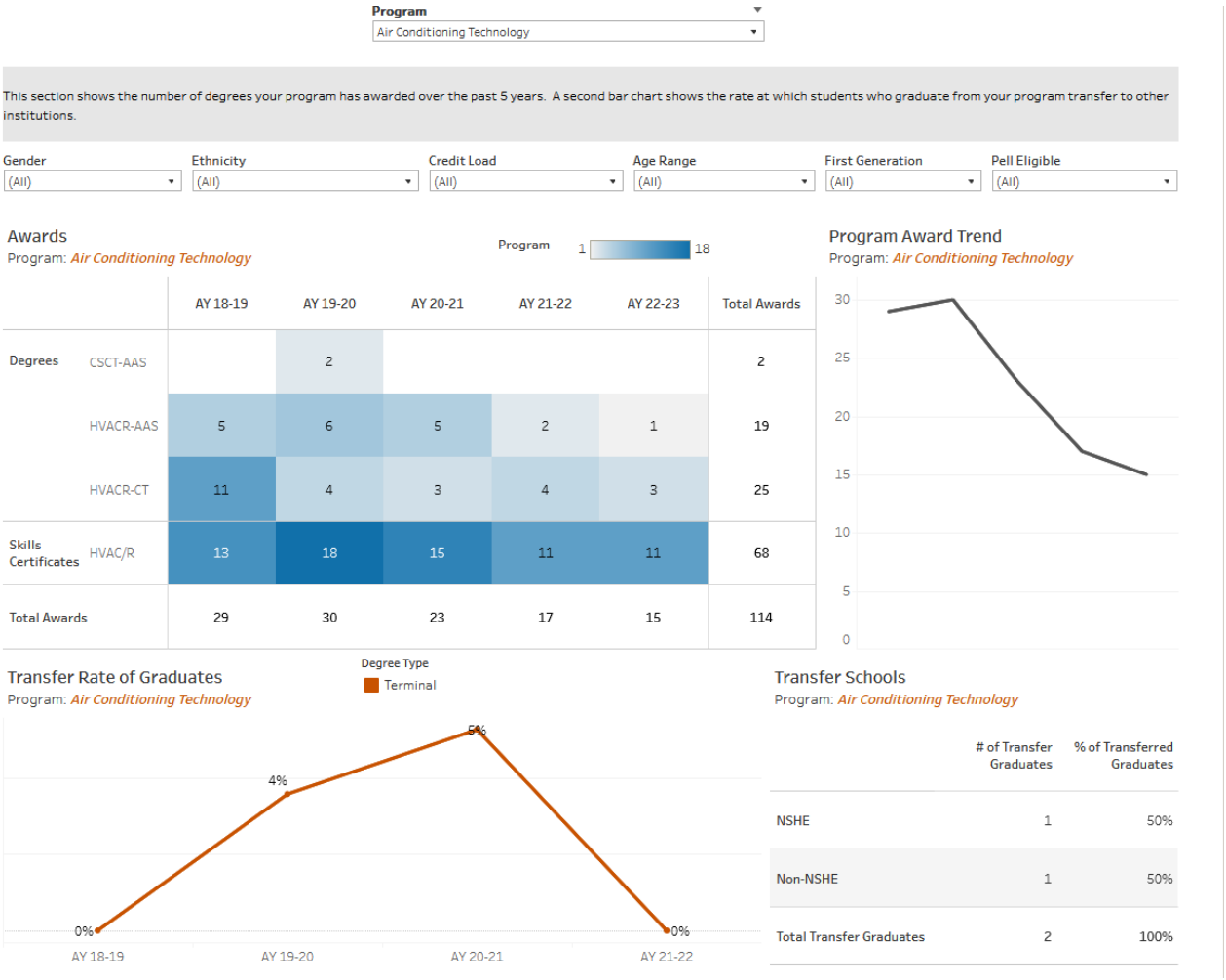
The AC program has a wide variety of equipment allowing for significant hands on training which increases student knowledge and preparation for the workforce. In line with this, the 5-year AC completion rates are at 87% with successful completion rates of 76%. This is above TMCC as a whole and in line with or slightly higher than Technical Sciences as a whole. There was a decline in completion and successful completion rates in Fall2020 as expected with covid. These trends suggest that students who complete the program are workforce ready and are motivated and confident to enter the workforce.

Data was disaggregated by gender, ethnicity, credit load, age, first gen status, and Pell eligibility. There were no equity gaps present. Particularly in female completion (94% compared to 87% total) and successful completion rates (89% compared to 76% total) there were no equity gaps although there was an equity gap noted in this area for enrollment.

5.B. Graduation and Transfer

Air Conditioning

Air Conditioning Technology PUR 2023-24 Self Study



Please discuss any trends or shifts that you see in the number of graduates and graduates who have transferred in the past 5 years.

Next, disaggregate the data by student demographics, and discuss any potential equity gaps: Which student populations are earning degrees or certificates compared to the demographic makeup of the program? Do graduates resemble the student demographics of the program? If not, discuss ideas to mitigate potential equity gaps.

The degree offered (Air Conditioning Technology Climate Control AAS) is not a transfer degree. The majority of awards are skills certificates recognized by the state of Nevada as completion. The

success rates for completion are high. There have been 114 total awards in the last 5 years. The CSCT-AAS degree is no longer offered. There have 68 skills certificates awarded over the 5-year span. The number of skills certificates awarded per year has been fairly consistent at 11-13/year, there was a bumper year in AY 19-20 with 18 awards. The completers do resemble the program demographics. Data was disaggregated for ethnicity, gender, age, first-generation, and Pell eligibility with no equity gaps found.

6.A. Faculty Achievement

Air Conditioning

Air Conditioning Technology PUR 2023-24 Self Study

Describe the program/unit's full-time (FT) faculty credentials, experience, and highlights of significant activities and/or contributions to TMCC. Please use the format below for each FT faculty member.

- **Faculty Name, FTE**
- **Degree(s) or professional certification(s) awarded, discipline, awarding institution**
- **Number of years teaching at TMCC**
- **Total number of years in academia**
- **Primary courses taught**
- **Significant activities or contributions made to TMCC (Please limit to 3)**
- **Substantial accomplishments or contributions to the community, especially those related to education or your discipline (e.g. mentoring, community service) (Please limit to 3)**

Wes Evans
Master Educational Leadership (UNR),
Bach of Business Management
AAS Air Conditioning Technology, Journeyman cards (HVACR)
27.5 years teaching at TMCC and 28 years total of academia
All AC's courses
Helped create VR in HVAC for Nevada
Helped write HVACR standards for Nevada
Rebranded the HVACR program
Help write and secure grant for Great Basin College and help develop the HVAC program
Help secure grant for Western Nevada College to build and develop the HVAC program

6.B. FT/PT Faculty and Student Credit Hours Taught

Air Conditioning

Air Conditioning Technology PUR 2023-24 Self Study

Describe the trends or shifts in the number of full-time (FT) and part-time (PT) faculty, and the number of student credit hours (SCH) taught by FT and PT faculty since the last program/unit review. What Impact, if any, have these trends or shifts had on the program/unit?

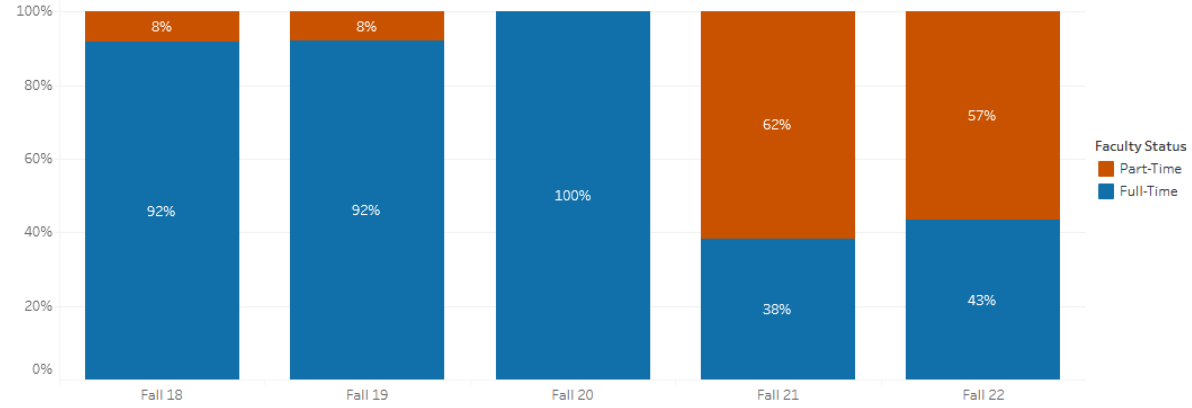
Faculty Workload

Program: Air Conditioning Technology

Term: Fall

Student Credit Hours

Program: *Air Conditioning Technology*



The above section shows the percent of student credit hours that were taught by Full-Time vs Part-Time faculty within your program's subject area. These student credit hours are not necessarily enrollments of your declared majors, they are enrollments by all students taking your courses. Student credit hours are defined as the sum of (enrolled students x units).

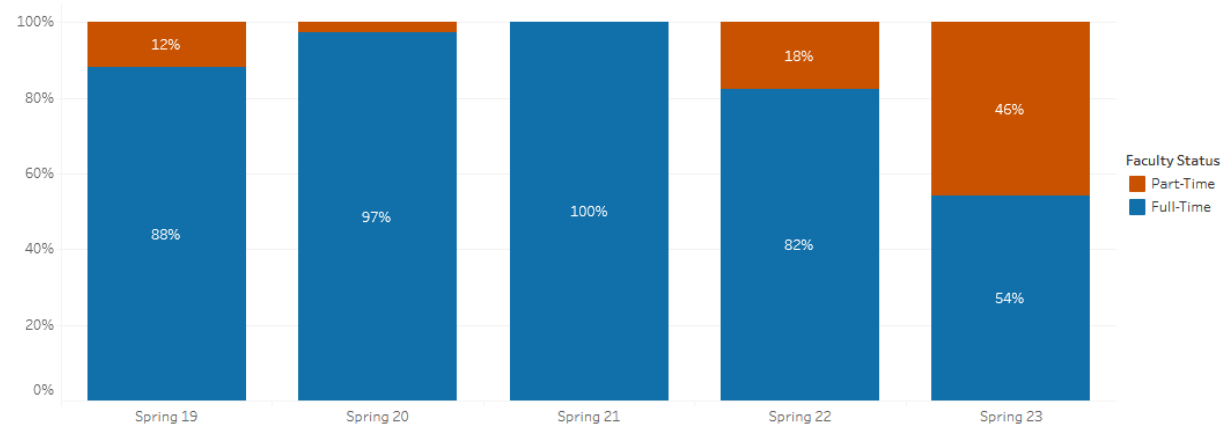
Headcount & FTE

Program: *Air Conditioning Technology*

	Full-Time		Part-Time	
	Headcount	FTE	Headcount	FTE
Fall 18	2	6.0	1	0.2
Fall 19	2	6.1	1	0.4
Fall 20	2	6.3		
Fall 21	1	1.0	2	4.2
Fall 22	1	1.0	2	2.0

Program: Air Conditioning Technology
Term: Spring

Student Credit Hours
Program: *Air Conditioning Technology*



The above section shows the percent of student credit hours that were taught by Full-Time vs Part-Time faculty within your program's subject area. These student credit hours are not necessarily enrollments of your declared majors, they are enrollments by all students taking your courses. Student credit hours are defined as the sum of (enrolled students x units).

Headcount & FTE
Program: *Air Conditioning Technology*

	Full-Time		Part-Time	
	Headcount	FTE	Headcount	FTE
Spring 19	2	6.6	1	0.4
Spring 20	2	6.3	1	0.2
Spring 21	2	4.7		
Spring 22	1	1.8	2	0.4
Spring 23	1	1.0	2	1.0

Scott Saulnier: business owner, journeyman in HVACR, over 30 years of experience. His primary duties at this time is to teach (AC 201, AC 102, and AC 106) the night time classes in HVACR.

Steve Bailey: HVAC Technician for UNR, Control Technician for Johnson Controls HVAC, with over 40 years of experience. His primary duties are teaching (AC 107, AC 113, AC 205) the night time classes.

One more part time instructor is needed in order to fulfill the demand for night time classes allowing us to not only to bring in more students but to keep up with students goals who are taking HVAC classes that want to finish up with a degree or skill certificate.

6.C. Support Staff

Air Conditioning

Air Conditioning Technology PUR 2023-24 Self Study

Describe the program/unit's support staff, including their FTE, major duties, and any specialized credentials necessary to carry out their duties. Is the number of staff adequate to support the program/unit? Explain.

The Division has one AA shared across all programs. Due to recent turn over, there are currently needs that are not being met. Due to these unmet needs, an additional AA for the Division is needed.

HVACR currently has one I.A. who works 19 hours per week. His responsibility is to help with loading equipment, making sure supplies are readily available for students and any clean up duties that are needed. The current I.A is only being used in the day time classes. The evening classes, which are at full capacity, are in need of an I.A. for similar duties. The requirements for being an I.A. are based on instructor recommendation and qualifications,

6.D. Facilities and Technology

Air Conditioning

Air Conditioning Technology PUR 2023-24 Self Study

Describe the facilities and technology used by the program/unit, and discuss any unique requirements. These may include labs, studios, off-campus sites, computer classrooms, specialized equipment, etc. Are program/unit facilities and technology adequate to support the program? Explain.

The HVACR program has 4 labs: Electrical/Controls and Motors lab; Refrigeration Servicing and Commercial Refrigeration lab; Residential Lite Commercial and Industrial lab; and an Industrial Controls lab. Most labs are set up with updated equipment seen in the industry and/or worked on. The Electrical/Controls and Motors lab needs motor control simulators and electrical control simulators to keep up with student needs. Addition of this equipment is necessary for the AC108 class ad would also benefit the AC 107 class, as those students would have additional wiring practice. This would allow for better scaffolding of learning throughout the skills certificates.

The program has one dedicated classroom for all classes day or night. Some classes taught are located in the lab, presenting the problem of teaching two classes in one lab at the same time leading student's to have a difficult time focusing on their course. A focus on more efficient scheduling can assist with this problem.

The only lab lost during the addition of more advanced manufacturing space, was the Brazing lab when the HVACR program was asked to relocate. This has most significantly impacted AC150, this is a prerequisite course for students to continue in the program. More students could be in the program (as the program is currently at capacity) which would better support industry needs if this space were restored.

7.A. Five-Year Plan

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Using your analyses from previous sections, develop a 5-year plan for the program(s). Include an estimated timeline of goal completion. Please address the following questions:

- **Using the most significant curriculum and assessment findings, describe strategies to sustain or improve student learning.**
- **After considering the most significant enrollment findings, discuss strategies, if needed, to improve enrollment and close equity gaps. These may include more efficient scheduling, streamlining pathways to completion, outreach to underserved students, addressing internal or external factors anticipated to impact future enrollment, etc.**
- **With respect to course completion rate, graduation, and transfer, discuss strategies to enhance student success and close equity gaps. These may include curriculum changes, pedagogical changes, streamlining pathways to completion, improving advising, mentoring, retention efforts, etc.**
- **Considering the above strategies, what are the major goals that the department/unit hopes to accomplish in the next 5 years? Include an estimated timeline for completing goals. How does the department or unit plan align with the Academic Affairs Strategic Plan or the College's Strategic Master Plan?**

Catalog clean up with new degree name and updated PSLOs. Fall 23

Efforts to embed more hands-on learning through out all classes in the HVACR program is believed to improve overall student learning. Using current and new technology with either books and or articles for the curriculum followed up with redundant hands-on demonstration and exercises. Spring/Fall 2024 and ongoing

Hiring a couple of instructors to help not only with enrollment but to ensure that current technology is being introduced to the new and current students in the HVACR program. Also with the addition of new instructors this will allow a seamless offering into the courses for the students without having to wait a semester to enroll. Spring 2024

Revise Skills Certificate to include AC 108. This will lead to increased completer success in the workforce as motor knowledge is essential. Fall 2024

Provide new and upcoming technology to both advanced and new students which will allow them

to enhance their knowledge in HVACR. Using the advisory board and any other methods to advertise the ongoing improvements and upgrades will help in the goal of advertising. Spring 2024 and continuing.

The major goal is to stay current in the HVACR world. The HVACR program will focus on student success, academic excellence and access to a lifelong learning attitude just as written by TMCC Mission statement. The program will maintain its professionalism while introducing HVACR to new students and current. Spring 2024 and continuing.

Financial preparations (RAP requests) will be submitted as equipment and refrigerant laws are being implemented. Fall 2025

Current equipment will need to have current refrigerant replaced. Spring 2026

In a changing industry it is not feasible to plan out 5-years in advance. The 5-year plan will be regularly updated to align with the workforce needs using the APR.

8.A. Resource Requests

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Identify any resource requests. For each request, please indicate whether the request is for an additional faculty and/or staff position, capital improvements (facilities), technology or specialized instructional resources, or professional development. Address the following items:

- **Request (Additional faculty/staff, capital improvements, technology or other specialized instructional resources, or professional development)**
- **Estimated time to hire or time the request will be made.**
- **Projected measurable outcomes. Which PLOs and/or student success metrics does the department hope to improve as a result of the request?**
- **Alignment to the Academic Affairs or College's Strategic Plan**

- Electrical simulators/trainer boards are needed for AC 107 and AC 108 as noted above.
  - As soon as possible
  - These are essential courses for the AAS and CoA.
  - Additional training will improve student learning.
- A safe area to teach Soldering and Brazing (AC 150)
  - As soon as possible
  - As noted in 6D, AC 150 is a fundamental component for the program
  - Aligns to workforce readiness
- Funding will be needed to replace all equipment based upon EPA laws and guidelines. At this time it's unknown when the laws will take effect.

- Time line cannot be provided as it depends upon federal legislation.
- This will be an essential need as the program cannot remain current without appropriate equipment.

- Hire a part-time Instructor Assistant
  - An IA is needed as soon as possible for the at capacity evening HVAC course
  - Pay rate is $20.00/hour with expectation of 19 hours/week
- Hire an additional Part Time instructor for the accelerated program to improve student: faculty ratio for better student learning, retention, and success rate.
  - Improvement of student success.
  - Fall 2024

Academic Standards and Assessment Committee Findings and Recommendations

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Academic Standards and Assessment Committee's Findings:

The Air Conditioning Technology program supports TMCC, our students, and community by proactively developing a highly skilled workforce in collaboration with the community, working to increase enrollment to keep pace with our community's growth, and supporting student success through the use of assessment results.

The need for a highly skilled workforce in Air Conditioning Technology is demonstrated by 21.25% projected growth in the industry through 2030. The program works with an outside advisory board to ensure that the program is supporting these community needs. This work is reflected in recommendations that have been made by the advisory board and incorporated into the program. Changes such as moving to traditional enrollment, and changing the name of the program have come from this advisory board and resulted in increased student enrollment. Other enrollment efforts include attending career days, job fairs, and the use of advertising flyers. From FA22 to FA23 the program experienced a 44% increase in enrollment.
The success of enrolled students has been supported by the programs incorporation of affordable texts, application of modern equipment for students to train on, and use of program level assessment results to modify curriculum. The success of the program's students in the workforce has been noted by their outside advisory board.

In order for the Air Conditioning Technology program to continue to grow and deliver a contemporary education in pursuit of a highly skilled workforce, the ASA committee supports the Air Conditioning Technology programs resource requests.

Program Strengths:

- One text is used throughout the program at a student cost of $25-30 per course. The program is actively investigating additional OER options.
- The program has an active advisory board which it works closely with to meet industry and student demands.
- Assessment has been completed at the PLO level and results were used to improve student learning in AC 102 and AC 113.
- The Air Conditioning Technology program is active in the community with enrollment outreach efforts.
- There has been a recent increase in enrollment to pre-COVID levels.
- Self-identifying female enrollment has been increasing steadily from year-to-year.
- The program is committed to incorporating more hands-on learning and contemporary training resources into the curriculum.

Areas of Concern or Improvement:

- Ensure learning outcomes assessment findings are supported with actual data.
- As self-identified in the PUR, UDOIT has not been run. There is no indication that faculty have attended PD/ workshops or taken other measures on accessibility.
- As self-identified in the PUR, there is a need to complete mapping of CoA Climate Control. Complete mapping PSLO2 for CoA HVAC/R.
- The program is in need of PT faculty, an IA and an AA.
- Training resources such as motor control and electrical control simulators are needed to support student demands.
- Extra space is needed to support AC 150.

Recommendations:

- Complete mapping of CoA Climate Control. Complete mapping PSLO2 for CoA HVAC/R. Ensure alignment of PSLO2 in climate control system skills certificate with CSLOs. Ensure all CSLOs throughout program offerings align with PSLOs.
- Ensure instructional materials are accessible. This may include attending professional development sessions on accessibility, and using accessibility checkers in all Canvas courses.
- The committee supports the hiring of an additional PT instructor, IA, and AA to support program growth.
- The Committee supports the need for more motor control and electrical control simulators.

- Continue to explore the options of shared/ flex spaces. We support HVACR receiving some of that shared space once available to support AC 150.

Other comments:

This question has not been answered yet

Dean's Findings and Recommendations

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Academic Dean’s Findings:

This is a well-written and thoughtful program review. There is clear evidence of faculty engagement in marketing, retooling and expanding the program to meet student demands. Enrollment has been increasing this semester; we are quickly becoming limited by space, equipment and LOA dollars. An external scan reveals this program is in-demand through 2030 so the resource requests should be addressed to align with this labor market need. the sole full-time faculty member should be commended for his commitment to continuous quality improvement as noted in the strengths. There are some anomalies noted in the PSLO mapping in the areas of improvement.

Strengths:

Congratulations to our lead faculty on writing the first Air Conditioning PUR, separate from the Construction Technologies program. The mission statement is succinct and reflects the intent of the department and programs housed within it. It aligns with the college's mission, vision and values and the college's strategic plan of workforce development. The program is meeting a workforce training need in Nevada with growth projections in the field exceeding 21% through 2030. The faculty is to be commended on keeping pace with instructional technology through the introduction of virtual reality (VR) training in the program and for accepting an opportunity to develop open education resource (OER) materials to reduce costs to students which can be a barrier to access. This PUR indicates how advisory board feedback has charted coures for the program to maintain relevance and currency. This PUR demonstrates how assessment drove curricular changes that improved students success, completing closing the loop on quality assessment for student learning. The program has done a commendable job in increasing diversity of student demographics with the program showing far greater diversity than the college as whole. Further, there were no equity gaps noted in successful completions with women actually outperforming the overall success rate. The lead faculty is to be commended for his perspective on acting as a facilitator in the classroom and utlizing active learning techniques that are yielding quality outcomes. He has also shown himself to be a leader in the region, providing assistance to other colleges in the state with their program development.

Areas for Improvement:

These comments are written so that Kim and Wes can work together to revise the PUR to correct typos and strengthen some of the sections. Then this language can be removed.

Section 2B - You have written about the advisory board in Section 2A and 3B. That information is pertinent to Section 2B, would address the prompts there and strengthen that section.
There are courses in the curriculum map for the AAS that don't map to any PSLOs. The question would be is that an omission and if not, why are those courses part of the program? The courses are AC 205 for the AAS. AC 108 & 113 and OSH222 don't map to any PSLOs in the COA of HVAC/R or the SC of HVAC/R but you have mentioned 108 and 113 there were pivotal in improving student success in 3B. Seems like they should be mapped to at least one PSLO. There is no mapping of the courses to PSLOs for the COA of Climate Control.
There are some typos in 4C.
Section 7 - The prompt asks about alignment with the Academic Plan and the College's Strategic Plan, Your program aligns with Objective 3 of the College's Academic Plan and the "workforce" objective of the College's Strategic Plan 2021- 2027. This would strengthen your responses in Section 7.

Summary Action Recommended (Continue program(s), significantly revise, discontinue, etc. followed by explanation):

This program is currently receiving a lot of attention. Industry has been contacting the dean and college regarding the need for trained employees and partnerships. We are currently writing a Department of Energy Grant that will focus on Air Conditioning Technologies to traing the workforce. Enrollment is at an all time high for the program. An external scan of regional labor market data indicates 21% plus growth in the field through 2030. This program should be continued and expanded to meet this demand.

Recommendations and Implementation Timeline:

The Division will need additional part-time dollars to expand course sections in Spring 2025 (sections could be added Fall 2024 if resources are available). Additional part-time faculty will need to be hired before Fall 2024 and creative scheduling done to maximize ability to serve students with the small class cap sizes we have due to facility constraints.

Resources Necessary for Implementation of Recommendations:

This program lacks the equipment and space to expand. There are also specific programmatic activities, like brazing, that cannot be completed indoors due to loss of space to other programs. Evening instructional assistance is needed. Additional funding is needed to increase the number of equipment, help in the classroom and facility space to ensure continued quality training to meet demands. As noted by the faculty, additional administrative assistant support is necessary.

Impact of Recommendations on Division Planning:

With limited space and LOA dollars, the dean and faculty will need to work together to distribute resources where demontstated need is highest. With the opening of the Plumb Lane Center for Advanced Manufacturing, the equipment in ESDN 177 will be moved there and the remainder can be placed in the other two labs. This will free up 177 to serve as a Flex Lab Space for a variety of programs and can be scheduled to meet needs like brazing activities, through the Department Chair. The Dean will need to express the additional financial needs for LOA dollars for part-timers and an evening IA to the VPFGA through the process he is initiating this year.

Impact of Recommendations on Program/Unit Faculty:

Because there is only one full-time faculty in the department, recommendations will fall to him and the dean to implement in partnership. I am confident, given appropriate resources we can expand this program to meet demand and continue the trajectory of success demonstrated in this review.

Vice President of Academic Affairs' Findings and Recommendations

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VPAA's Findings and Conclusions: (Include which of the ASA Committee's and Dean's findings and recommendations were upheld or not upheld.)

The HVAC program at TMCC is a vital part of our Applied Technologies program lineup, and it serves several important workforce needs in our community. Its connections to area employers are strong, and their input via our advisory board keeps the program abreast of developments in the field. It has also made efforts to attract female students and see them succeed, which is ideal in this male-dominated sector.

Strengths:

The key strengths of this program are its lead faculty, Wes Evans, and its remarkable facilities, which boast exceptional spaces, equipment, and opportunities for students to learn in well-appointed labs. The advisory board is another strong point, as its input has helped the program to evolve in recent months, particularly in its shift back to scheduled classes instead of open-entry labs. Other decisions, like moving toward 90% lab and 10% book, and adding more wiring lab exercises, have helped students to perform better, making them better graduates for our workforce. These changes indicate a willingness to be flexible, to experiment with new formats and structures, and to shift approaches based upon data and industry feedback. The payoff has come in this Fall's headcounts, which are very robust.

Areas for Improvement:

The program points out that it lost its brazing lab, so the idea of restoring this space is worth exploring together with the Dean. The UDOIT loop should be closed, and the Committee recommends that the faculty member attend PD events and explore accessibility options. The program should also continue to recruit PT instructors in order to develop a succession plan for the future; newer instructors will benefit greatly from Wes' support and coaching.

Recommendations and Next Steps for the Program Based on the PUR:
(Include whether the program should be continued, significantly revised, or discontinued, followed by a rationale.)

This program should certainly continue. It recruited strongly this Fall, which bodes well for the future and for the area's workforce. With so many new employers coming to the area, particularly manufacturing firms that are erecting new plants, our region will continue to see growing job demand in this sector.

Resources Needed to Implement Recommendations Towards Program Improvement or Enhancement:

The provision of a brazing lab or a flex-space that can serve in this capacity some of the time will help, as will recruiting an LOB instructor in the future, to shadow Wes and learn whatever they can about the labs, program, and pedagogy. The program should work with Kylie Rowe and her MCO team to produce Marketing Toolkit content that promotes HVAC. Their new Canva platform will enable programs to customize their own programmatic marketing content for a variety of audiences and media venues.