Maine Community College System
Five Year Program Review

College: Central Maine Community College
Program: Plumbing & Heating Technology
CIP: 46.0503
Credentials: Associate in Applied Science (AAS)/Certification

Review Team: Tobby Bragdon, Eric Berg, Marc Gilbert, Jeff Green, David Lewis, Jessica Mean, Jim Allard
Date: March 2025
Period of Review: AY 2018/2019-2022/2023

Program Overview:

1) **Program description** (*from the most recent college catalog*):

The Associate in Applied Science Degree in Plumbing & Heating Technology will prepare students for a career in the plumbing and heating industry with skills to assist with the installation and repair of systems in residential and commercial settings. Students will gain knowledge of state codes and requirements. Graduates are eligible to acquire the State of Maine Journeyman 1 & 2 Oils - up to 15 GPH licensure and eligible to acquire State of Maine licensure as a propane and natural gas technician.

2) Program Learning Outcomes: all program learning outcomes are expected to be assessed within the five-year cycle. Please attach an Assessment Data and Reflection Template for each program learning outcome. Explain how the department used the assessment results to improve teaching, learning, and the curriculum.

List the program learning outcomes:	Method of assessment: list the courses and activities/assignments used to assess the learning outcomes
1. Describe basic tools used for standard residential and light commercial plumbing and heating projects. 2. Identify and explain plumbing and heating methods, calculations, materials and systems. 3. Identify the local, state and national codes required for compliance in the design, installation and repair of plumbing and heating systems. 4. Differentiate the installation procedures for various types of heating systems. 5. Describe the methods for completing plumbing heating service work, performing calculations and safe work practices. 6. Diagnose and repair plumbing and heating systems.	1. PHT 103 – Plumbing and Heating Technology I PHT 135, Electricity pumps and Hydronics, and PHT 207 – Heating I. Students are assessed in their ability to use plumbing and heating materials / tools to build systems that are compliant to the Maine State Plumbing and Fuel Code. They are educated in best electrical practices associated with their licensure that are compliant with the NFPA 70 – the National Electrical Code. A.A.S students are further educated in the use of NFPA 31 and 54 that are associated with the use of carbon fuels 2. PHT 225 - Plumbing Technology II. Students learn to apply IAPMO Plumbing Code methods as adopted by the Maine State Plumbing Board. Students are assessed on the proper use of materials, tools and best installation methods. 3. PHT 100 – Plumbing Code, PHT 225 – Maine Oil and Solis Fuel Code, PHT 229 – Maine Propane and Natural Gas Code. Students learn how to interpret State of Maine adopted codes and prepared to practically apply the codes in PHT 125, PHT 259 and PHT 259. 4. PHT 257 – Heating I and PHT- 259 Propane and Natural Gas II. Student are assessed in their ability to properly apply codes and installation methods to live fire working mockups. They are assessed in their ability to properly wire various carbon fired pieces of equipment

	with safeties in place to prevent over-heating, automatic temperature control and appropriate venting. 5. OHS 111 – Construction Safety & Health, Mat 104 – Technical Math PHT 257 - Heating II, PHT 259 – Propane and Natural Gas II Students are required to obtain a 10-hour OSHA Construction Safety and Health Card. Students are assessed in their abilities to comprehend heating equipment flow charts for no heat and other system failures. Students are assessed in their ability to understand measurements, percentages and algebraic formulas. Students are required to obtain a 10 hour OSHA Construction Safety and Health Card. Troubleshooting flow charts while applying 6., PHT 125 – Plumbing Technology II, PHT 257 – Heating II and PHT 259 - Propane and Natural Gas II. They are assessed in troubleshooting modern heating equipment, by providing solutions for mock ho heat calls and providing service work for various plumbing system components, such as faucets, flush valves, toilets and garbage disposals.

3) Credentials Awarded within the IPEDS year, i.e. July 1-June 30:

Credentials Awarded					
Credential	AY1920	AY2021	AY2122	AY2223	AY2324
AAS	--	3	9	5	10
Certificate	9	2	4	1	5

4) Program Graduates Employed:

Number of Completers with any Wage Data	12
% of Completers with any Wage Data	86%
# of Completers with First Year Earnings	--
Median First Year Earnings	--

5) Partnerships, collaborations, associations and memberships

a) Advisory Meeting Dates and Attendance (past 3 years)

Date(s) of Meeting	*# of college attendees*	*# of Non-college attendees*
11/4/21	2	3
11/2/22	1	6
2023 no meeting held	--	--

b) Program external accreditation, associations, and memberships (if applicable):

6) Other Indicators of student success, direct and/or indirect, which may include:

	AY1920	AY2021	AY2122	AY2324	AY2425
Licensure/certification pass rates (if applicable)	--	--	--	--	--
Program Advisory Committee Member Survey (on scale of 1-5 averaged):	--	--	--	--	--
Program Curriculum	--	--	--	--	--
Technical currency of the program	--	--	--	--	--
Preparation of program graduates for work in the field	--	--	--	--	--
Communication from program administration/faculty	--	--	--	--	--
Overall quality of the program	--	--	--	--	--
Other (please specify):	--	--	--	--	--

7) Student demographics:

Admissions					
AAS	AY1920	AY2021	AY2122	AY2223	AY2324
Fall Applications	24	50	37	29	33
% chg in Fall Applicants from PY	--	108%	-26%	-22%	14%
Enrolled (Yield)	14	18	15	9	10
% chg in Enrolled from PY	--	29%	-17%	-40%	11%
Admissions - Certificate					
Certificate	AY1920	AY2021	AY2122	AY2223	AY2324
Fall Applications	13	11	15	4	23
% chg in Fall Applicants from PY	--	-15%	36%	-73%	475%
Enrolled (Yield)	4	3	4	2	4
% chg in Enrolled from PY	--	-25%	33%	-50%	100%

Student Enrollment[1]					
AAS	AY2021	AY2122	AY2223	AY2324	AY2425
Unduplicated Headcount Enrolled in Program	30	29	29	28	43
% chg in Headcount from PY	--	-3%	0%	-3%	54%
Enrolled Credit Hours	347	378	373	323	589
% chg in Credit hours from PY	--	9%	-1%	-13%	82%
FTE	23	25	25	22	39
% chg in FTE from PY	--	9%	-1%	-13%	82%
Student Enrollment - Certificate					
Certificate	AY2021	AY2122	AY2223	AY2324	AY2425
Unduplicated Headcount Enrolled in Program	4	6	5	8	12

% chg in Headcount from PY	--	50%	-17%	60%	50%
Enrolled Credit Hours	45	61	66	75	143
% chg in Credit hours from PY	--	36%	8%	14%	91%
FTE	3	4	4	5	10
% Change in Credit Hours and FTE from PY	--	36%	8%	14%	91%

[1] = students within the program in the fall of the academic year

Student Success - AAS					
Cohort Year- AAS	AY2021	AY2122	AY2223	AY2324	AY2425
Cohort Enrollment	25	18	15	21	31
Retained to the next semester	76%	83%	47%	67%	--
Retained to the next year	40%	72%	33%	38%	--
Graduation Rates- AAS					
100% of program time	24%	17%	13%	5%	
150% of program time	36%	44%	13%		
200% of program time	40%	44%			
Transfer Rate (non-graduates)[2]	4%	0%			
Transfer Rate (graduates)	0%	0%			
Enrolled in Another Program[2]	4%	--			
Graduated from Another Program[2]	12%	0%			
Student Success Certificate					
Cohort Year- Certificate	AY2021	AY2122	AY2223	AY2324	AY2425
Cohort Enrollment	5	4	4	8	11
Retained to the next semester	80%	50%	100%	25%	--
Retained to the next year	20%	25%	25%	13%	--
Graduation Rates- Certificate					
100% of program time	20%	50%	75%	13%	
150% of program time	20%	50%	100%		
200% of program time	20%	50%	100%		
Transfer Rate (non-graduates)[2]	20%	0%			
Transfer Rate (graduates)	0%				
Enrolled in Another Program[2]	20%				
Graduated from Another Program[2]	20%				

[2]. Determined at the maximum graduation point in this table, i.e. 200%

8) Strengths, challenges, and planned steps for continuous improvement: In your summary assessment you should reference sections of this review that informs the plan.

Program Strengths

- The program started in 2019 and since then enrollment has grown significantly each year. The increasing enrollment in the program reflects its growing success and the strong demand for hands-on training in the state.
- The program has four full-time faculty who bring over 175 years of combined industry experience. Faculty maintain state licenses and attend a wide array of professional development opportunities to broaden skills. The success of the program is attributed to these faculty members who built it and continue to develop it.
- The two-story lab features commercial mockups with cast iron carriers and residential mockups with fiberglass tub/shower units, providing students with hands-on training in both sectors.
- Beyond the formal lab space, students also have access to an outdoor mockup construction site shared with the Building Construction Trades department. This collaborative environment allows HVT, PHT, and BCT students to engage in multidisciplinary projects that mirror real-world residential construction challenges.

Challenges:

- The Plumbing and HVAC programs share space. High enrollment in both programs has led to challenges with the physical space.
- Adjunct faculty can be difficult to find because they can make more money in the field.
- Program equipment is expensive and since it was all installed at relatively the same time, it may need to be replaced in a similar timeframe.

Planned steps for continuous improvement:

- The department is committed to exploring innovative instructional technologies to enhance efficiency and improve the learning experience. Examples may include: virtual and augmented reality equipment.
- Faculty members will continue to participate in professional development opportunities to identify emerging technologies and teaching methods, some of which are already being implemented in PHT 207 and PHT 259.
- Heat and other resources have been provided to the outdoor mockup buildings so the spaces can be used year-round for instruction.
- The College will use its capital technology plan to be prepared for when equipment may need to be replaced.
- The department will continue strengthening industry connections by engaging professionals from the plumbing, HVAC/R, and regulatory sectors to serve on the advisory council.
- Partnerships with industry manufacturers will provide students with valuable installation certifications, while collaboration with code enforcement agencies will bring code seminars to campus, further enriching the program.

Five-year Assessment Plan for Student Learning Outcomes

Plumbing & Heating Technology — March 2025

Name of Program or General Education Domain

Learning goal:

Student learning outcomes:	Academic year during which assessment will occur	Source(s) and type of assessment artifact(s) that will be collected (e.g.: embedded questioning, capstone assignments, standardized testing, performance observation, portfolio reviews, etc.)	Method(s) to be used for assessing artifact(s)	Assessment Goal (targets/criteria) for direct measure	Assessment Outcome (*Number of Students Achieving an "acceptable" or better*)	Assessment Goal was:		
						Met	Not Met	Pending Review
Describe basic tools used for standard residential and light-commercial plumbing and heating projects	2024-2025	Performance observation, embedded questioning	Instructor evaluations, skill demonstrations	85% of students correctly identify and describe tool usage in hands-on assessments	85% or better			X
Identify and explain plumbing and heating methods, calculations, materials, and systems	2024-2025	Standardized testing, capstone assignments	Written exams, student presentations, lab-based assessments	80% of students achieve a passing score on method and materials exams	85% or better			X
Identify the local, state, and national codes required for compliance in the design, installation, and repair	2024-2025	Code seminar participation, standardized testing	Assessments following code seminars and industry	85% of students pass industry code exams or certifications	85% or better	X		

of plumbing and heating systems			certification exams					
Differentiate the installation procedures for various types of heating systems	2024-2025	Performance observation, portfolio reviews	Instructor evaluations of installation projects, written reports	80% of students correctly differentiate and apply installation procedures in assessments	85% or better			X
Describe the methods for completing plumbing heating service work, performing calculations, and safe work practices	2024-2025	Embedded questioning, performance observations	Instructor evaluations, student self-assessments	90% of students demonstrate safe work practices and correctly perform calculations	85% or better			X
Most significant assessment findings? (Pedagogical, instructional, curricular changes). Please report on actions taken and on ongoing assessment plans.								