Advanced Plumbing Unit 1

Content Area: **CTE**
Course(s):
Time Period: **September**
Length: **MP 1 (45 Days)**
Status: **Published**

Unit Overview:

Unit 1: Advanced Plumbing Safety, Resume Writing, Blueprint Reading & Design, and NJ Plumbing Codebook Use

Duration: 45 Instructional Days (September – November)

Unit Overview

This unit introduces students to the essential skills and safety standards required in the advanced plumbing field. Students will review and expand on industry safety practices, including personal protective equipment, hazard recognition, and compliance with OSHA and NJ state safety regulations. Students will develop a professional resume tailored for plumbing-related careers and explore strategies for effective job searches and interviews. Blueprint reading and design skills will be emphasized, enabling students to interpret plumbing schematics and create basic system layouts. Students will also learn to navigate and apply the New Jersey Plumbing Codebook to ensure compliance with state regulations. By the end of the unit, students will have the foundational technical, safety, and professional skills necessary to perform advanced plumbing tasks with confidence and accuracy.

Essential Questions:

Essential Questions

1. How do professional safety practices ensure efficiency and prevent injury in advanced plumbing work?
2. What information should be included in a professional plumbing resume to appeal to potential employers?
3. How can plumbing blueprints be accurately interpreted and applied to real-world installations?
4. Why is understanding and applying the New Jersey Plumbing Code essential to advanced plumbing work?

Enduring Understandings:

Enduring Understandings

- Safety practices protect workers, clients, and property in all plumbing environments.

- A well-crafted resume highlights a candidate's skills, certifications, and experience to improve employability.
- Blueprint reading is a critical skill for ensuring accurate plumbing installations and repairs.
- Compliance with the New Jersey Plumbing Code is necessary for legal, safe, and effective plumbing work.

Standards/Indicators/Student Learning Objectives (SLOs):

Standards / Indicators / Student Learning Objectives

Applicable Architecture & Construction Standards

Cluster: Architecture & Construction

- **9.3.12.AC.1** Use vocabulary, symbols, and formulas common to architecture and construction.
- **9.3.12.AC.3** Comply with regulations and applicable codes to establish and manage a legal and safe workplace.
- **9.3.12.AC.6** Read, interpret, and use technical drawings, documents, and specifications to plan a project.

Pathway: Construction (AC-CST)

- **9.3.12.AC-CST.5** Apply practices and procedures required to maintain jobsite safety.
- **9.3.12.AC-CST.9** Safely use and maintain appropriate tools, machinery, equipment, and resources to accomplish construction project goals.

Pathway: Design/Pre-Construction (AC-DES)

- **9.3.12.AC-DES.2** Use effective communication skills and strategies (listening, speaking, reading, writing, and graphic communications) to work with clients and colleagues.
- **9.3.12.AC-DES.4** Apply building codes, laws, and rules in the project design.
- **9.3.12.AC-DES.6** Apply the techniques and skills of modern drafting, design, engineering, and construction to projects.

Pathway: Maintenance/Operations (AC-MO)

- **9.3.12.AC-MO.1** Recognize and employ universal construction signs and symbols to function safely in the workplace.

9.3.12.AC.1	Use vocabulary, symbols and formulas common to architecture and construction.
9.3.12.AC.3	Comply with regulations and applicable codes to establish and manage a legal and safe workplace.

9.3.12.AC.6	Read, interpret and use technical drawings, documents and specifications to plan a project.
9.3.12.AC-CST.5	Apply practices and procedures required to maintain jobsite safety.
9.3.12.AC-CST.9	Safely use and maintain appropriate tools, machinery, equipment and resources to accomplish construction project goals.
9.3.12.AC-DES.2	Use effective communication skills and strategies (listening, speaking, reading, writing and graphic communications) to work with clients and colleagues.
9.3.12.AC-DES.4	Apply building codes, laws and rules in the project design.
9.3.12.AC-DES.6	Apply the techniques and skills of modern drafting, design, engineering and construction to projects.
9.3.12.AC-MO.1	Recognize and employ universal construction signs and symbols to function safely in the workplace.

Lesson Titles:

Lesson Titles (Individual and Groups)

1. Introduction to Advanced Plumbing Safety
2. OSHA Standards and NJ State Safety Regulations
3. Personal Protective Equipment Selection and Use
4. Hazard Identification and Risk Prevention in Plumbing
5. Safe Use of Plumbing Tools and Equipment
6. Jobsite Safety Protocols and Emergency Procedures
7. Introduction to Resume Writing for Plumbing Careers
8. Identifying Transferable Skills and Experience
9. Formatting and Writing a Professional Plumbing Resume
10. Resume Review and Peer Feedback
11. Interview Preparation and Communication Skills
12. Mock Interview Practice and Feedback
13. Introduction to Blueprint Reading in Plumbing
14. Plumbing Blueprint Symbols and Terminology
15. Reading and Interpreting Residential Plumbing Plans
16. Drawing Basic Plumbing System Layouts
17. Introduction to Plumbing System Design Principles

18. Introduction to the NJ Plumbing Codebook
19. Organization and Structure of the Codebook
20. Locating Plumbing Code Requirements for Installations
21. Code Compliance for Water Supply Systems
22. Code Compliance for Drainage, Waste, and Vent Systems
23. Applying the NJ Codebook to Real-World Scenarios
24. Codebook Scavenger Hunt Activity
25. Unit Review and Practical Assessment

Career Readiness, Life Literacies, & Key Skills:

Career Readiness, Life Literacies, and Key Skills Standards

Career Awareness and Planning (WRK.9.2.12.CAP)

- **WRK.9.2.12.CAP.4** Evaluate different careers and develop plans including educational/training requirements, costs, and timelines.
- **WRK.9.2.12.CAP.5** Assess and modify a personal plan to support current interests and post-secondary plans.
- **WRK.9.2.12.CAP.6** Identify transferable skills in career choices and design alternative career plans based on those skills.
- **WRK.9.2.12.CAP.7** Use online resources to examine licensing, certification, and credentialing requirements at the local, state, and national levels.
- **WRK.9.2.12.CAP.8** Determine job entrance criteria used by employers in the plumbing and construction industry.

Career Planning and Employment Preparation

- **WRK.9.2.12.CAP.2** Develop college and career readiness skills by participating in opportunities such as apprenticeships or structured learning experiences.
- **WRK.9.2.12.CAP.3** Investigate how continuing education contributes to career and personal growth.

Technology Literacy (TECH.9.4.2.TL)

- **TECH.9.4.2.TL.2** Create a document using a word processing application (resume and cover letter).
- **TECH.9.4.2.TL.6** Illustrate and communicate ideas using multiple digital tools (blueprint software,

code reference tools).

WRK.9.2.12.CAP.2	Develop college and career readiness skills by participating in opportunities such as structured learning experiences, apprenticeships, and dual enrollment programs.
WRK.9.2.12.CAP.3	Investigate how continuing education contributes to one's career and personal growth.
WRK.9.2.12.CAP.4	Evaluate different careers and develop various plans (e.g., costs of public, private, training schools) and timetables for achieving them, including educational/training requirements, costs, loans, and debt repayment.
WRK.9.2.12.CAP.5	Assess and modify a personal plan to support current interests and post-secondary plans.
WRK.9.2.12.CAP.6	Identify transferable skills in career choices and design alternative career plans based on those skills.
WRK.9.2.12.CAP.7	Use online resources to examine licensing, certification, and credentialing requirements at the local, state, and national levels to maintain compliance with industry requirements in areas of career interest.
WRK.9.2.12.CAP.8	Determine job entrance criteria (e.g., education credentials, math/writing/reading comprehension tests, drug tests) used by employers in various industry sectors.
TECH.9.4.2.TL.2	Create a document using a word processing application.
TECH.9.4.2.TL.6	Illustrate and communicate ideas and stories using multiple digital tools (e.g., SL.2.5.).

Inter-Disciplinary Connections:

Inter-Disciplinary Connections

- **ELA:** Resume writing, technical reading comprehension from codebook and blueprints
- **Mathematics:** Measurement, scaling, and calculations from blueprints
- **Technology:** Use of digital drafting tools for blueprint creation

Summative Assessment:

Summative Assessment

High-Stakes Assessments:

- **Comprehensive Exams:** Final exams covering a broad range of course material can assess students' understanding of key concepts and principles.
- **Capstone Project Presentations:** Formal presentations showcase students' project management skills, decision-making, and communication abilities.

Performance-Based Assessments:

- **Project Portfolio Reviews:** A portfolio compiled throughout the program can demonstrate a student's growth, technical skills, and problem-solving abilities in various areas of the plumbing trade.
- **Simulated Project Management Tasks:** Students could be presented with a realistic construction scenario where they must apply their knowledge and skills to develop solutions or make critical decisions.

Industry-Standard Certifications:

- Encouraging students to pursue industry certifications relevant to plumbing can demonstrate their commitment to the field and mastery of specific skills.

Considerations for Choosing Summative Assessments:

- **Alignment with Learning Outcomes:** Ensure the chosen assessments directly measure the program's overall learning objectives and desired competencies.
- **Depth vs. Breadth:** Balance the need to assess a broad range of knowledge with in-depth exploration of critical skills.
- **Authenticity:** Choose assessments that reflect real-world scenarios and tasks a plumber encounters.
- **Multiple Measures:** Utilize a combination of assessments to provide a holistic picture of student learning.
- **Faculty Collaboration:** Ensure consistency and fairness in assessments across different courses within the program.

Additional Tips:

- Develop clear rubrics outlining specific criteria for evaluating performance on each summative assessment.
- Provide students with ample opportunities to practice and refine their skills before summative assessments.
- Offer feedback on summative assessments to help students identify areas for improvement and guide their future learning.

- Alternate Assessment
- Benchmark
- Group Project Assessment
- Individual Project Assessment
- Marking Period Assessment
- Module Section Assessment

Benchmark Assessments

Benchmark Assessments

1. **Safety Skills Performance Test** – Students demonstrate proper PPE use, hazard identification, and tool safety in a simulated work environment.
2. **Resume Submission** – Completed professional plumbing resume and cover letter graded with a rubric.
3. **Blueprint Interpretation Quiz** – Identify symbols, interpret plumbing plans, and answer code-related questions.
4. **NJ Plumbing Codebook Application Test** – Locate specific code requirements and explain their application to sample scenarios.

Alternative Assessment

Alternative Assessments

1. **Safety Training Video Project** – Students create a short instructional video demonstrating correct PPE usage and hazard prevention.
2. **Peer Resume Review Workshop** – Students review each other's resumes, provide constructive feedback, and revise.
3. **Blueprint-to-Build Challenge** – Students sketch a basic plumbing layout from a written description

and verify it against code.

4. **Codebook Scavenger Hunt** – Timed activity locating key code sections, scored for speed and accuracy.

Formative Assessment:

Formative Assessment

In-Class Activities:

- **Quick Quizzes:** Short, unannounced quizzes at the beginning or end of class can assess comprehension of key concepts from previous lessons or gauge readiness for new material..
- **Think-Pair-Share:** Encourage individual reflection followed by partnered discussions and sharing key takeaways with the class. This promotes active learning and identifies common misconceptions.
- **Minute Papers:** Have students write a one-minute summary of the main points learned or lingering questions they have. This helps identify areas needing clarification.

Classroom Discussions & Activities:

- **Open-ended Questions:** Encourage students to think critically and elaborate on their understanding by posing open-ended questions throughout lessons.
- **Case Studies & Problem-solving:** Present real-world plumbing scenarios or problems for students to analyze and propose solutions. This assesses critical thinking and application of knowledge.
- **Role-playing Activities:** Simulate real-world situations like project meetings or client interactions to practice communication, negotiation, and problem-solving skills.

Peer-Based Assessment:

- **Peer Reviews:** Students can review each other's work, providing constructive feedback on project plans, presentations, or technical drawings. This fosters collaboration and self-assessment skills.
- **Group Work & Discussions:** Collaborative activities encourage students to explain concepts to one another, solidifying their understanding and identifying areas where they can learn from peers.

Technology-assisted Assessments:

- **Online Quizzes & Polls:** Utilize online platforms for short quizzes, polls, or concept checks to gauge student understanding in real-time and adjust instruction accordingly.
- **Self-assessment Tools:** Provide online quizzes or exercises where students can assess their own understanding of key concepts and identify areas for self-directed learning.

Benefits of Formative Assessment:

- **Improved Student Learning:** Provide ongoing feedback that helps students identify strengths, weaknesses, and adjust their learning strategies.
- **Informed Instruction:** Instructors gain valuable insights into student understanding, allowing them to

adapt teaching methods and address misconceptions promptly.

- **Increased Student Engagement:** Active participation in formative assessments keeps students engaged and invested in the learning process.
- **Promotes Self-reflection:** Encourage students to reflect on their learning journey, identify areas for improvement, and take ownership of their learning.

- Anticipatory Set
- Exit Tickets
- Hands-On Activities (Individual & Groups)
- Hands-On Observations (Individual & Groups)
- Questioning, Scenarios, and Problem-Solving (Open Ended & Multiple Choice
- Warm-Up

Resources & Materials:

Resources & Materials

Plumbing Level 1 Book NCCER Fifth Edition

Plumbing Level 2 Book NCCER Fifth Edition

Plumbing Level 3 Book NCCER Fifth Edition

Google Classroom

Google Gemini

Promethean Board

Canva

Clever

Diffit

Kahoot

MagicSchool

https://www.youtube.com/

CBS Plumbing Trade

https://www.cbsnews.com/video/plying-their-trades/#

Run Time 7:20

Toilet

How The Toilet Changed History

Run Time 7:15

Toilet Parts: What They Are and Common Fixes (DIY) | Family Handyman.

Workplace Hazards Video Run Time

Top 6 Workplace Hazards Identified

Run Time 8:11

PPE Video

PPE - Safety Training Video Course - SafetyInfo.com

Run Time 10:49

NJ Master Plumbers Information

New Jersey Plumbing License Requirements

NJ Plumbing Wages

Plumber salary in New Jersey

Plumbing Trade Video

6 Lessons I Learned as a Plumbing Apprentice

Time 9:03

Plumbing Trade Video

Plumbers Can SPECIALISE In Many Area... Here Are The Different Types!

Run Time 8:23

Mike Rowe On The Trades

https://youtu.be/3h_pp8CHEQ0

Run Time 8:25

PPE

Plumbing PPE Plumbers Must NEVER Work Without!

Run Time 9:04

FATAL Plumbing Mistakes EVERY Plumber Needs To Know About!

Run Time 8:09

NJ One Call

New Jersey One Call

Power Tools

Let's learn about a couple of plumbing power tools - Plumbing Power Tools

Run Time 12:34

Types Of Hot/Cold Water Pipes And Fittings

PEX vs COPPER vs CPVC plumbing pipes

Run Time 16:55

Plastic Pipe

Gluing PVC Pipe & ABS Pipe [How To]

Run Time 8:16

Plastic Pipe

10 MISTAKES When Working With Plastic Pipes (PVC, CPVC & ABS) | GOT2LEARN

Run Time 8:26

IPS

When to Use Pipe dope, Teflon Tape, Neither or Both for Threaded Connection

Run Time 3:54

IPS

How to Use a Pipe Wrench

Run Time 4:31

IPS

RIDGID 300 Compact Threading Machine

Run Time 18:26

OSHA

Top OSHA 10 OSHA Violations of 2023 | And how to prevent similar citations.

Run Time 8:51

Ladder Safety

Run Time 4:33

Personal Protective Equipment Milwaukee

Old vs. new growth trees and the wood products they make

Instructional Strategies, Learning Activities, and Levels of Blooms/DOK:

Instructional Strategies

- Direct Instruction with demonstration
- Guided and independent practice
- Think-Pair-Share for problem-solving codebook scenarios
- Project-based learning through blueprint creation
- Peer feedback on resume drafts

Learning Activities

- PPE inspection and hazard identification workshop
- Resume drafting and peer review
- Blueprint reading exercises with real-world plans
- Student-created plumbing layout for a small residential project

- NJ Plumbing Codebook scavenger hunt challenge

Bloom's / Depth of Knowledge (DOK) Levels

- **Remembering:** Recall safety protocols and PPE requirements
- **Understanding:** Explain blueprint symbols and codebook organization
- **Applying:** Use the NJ Plumbing Code to plan an installation
- **Analyzing:** Evaluate blueprint accuracy and compliance with code
- **Creating:** Design a plumbing layout and a professional resume

Modifications

ELL Modifications:

- Choice of test format (multiple-choice, essay, true-false)
- Continue practicing vocabulary
- Provide study guides prior to tests
- Read directions to the student
- Read test passages aloud (for comprehension assessment)
- Vary test formats

G&T Modifications:

- Alternate assignments/enrichment assignments
- Enrichment projects
- Extension activities
- Higher-level cooperative learning activities
- Pairing direct instruction with coaching to promote self-directed learning
- Provide higher-order questioning and discussion opportunities
- Provide texts at a higher reading level
- Tiered assignments
- Tiered centers

At Risk Modifications

The possible list of modifications/accommodations identified for Special Education students can be utilized for At-Risk students. Teachers should utilize ongoing methods to provide instruction, assess student needs, and utilize modifications specific to the needs of individual students. In addition, the following may be considered:

- Additional time for assignments
- Adjusted assignment timelines
- Agenda book and checklists
- Answers to be dictated
- Assistance in maintaining uncluttered space
- Books on tape
- Concrete examples
- Extra visual and verbal cues and prompts
- Follow a routine/schedule
- Graphic organizers
- Have students restate information
- No penalty for spelling errors or sloppy handwriting
- Peer or scribe note-taking
- Personalized examples
- Preferential seating
- Provision of notes or outlines
- Reduction of distractions
- Review of directions
- Review sessions
- Space for movement or breaks
- Support auditory presentations with visuals
- Teach time management skills
- Use of a study carrel
- Use of mnemonics
- Varied reinforcement procedures
- Work in progress check

IEP & 504 Modifications:

*All teachers of students with special needs must review each student's IEP. Teachers must then select the appropriate modifications and/or accommodations necessary to enable the student to appropriately progress in the general curriculum.

Possible Modifications/Accommodations: (See listed items below):

- Allow for redos/retakes

- Assign fewer problems at one time (e.g., assign only odds or evens)
- Differentiated center-based small group instruction
- Extra time on assessments
- Highlight key directions
- If a manipulative is used during instruction, allow its use on a test
- Opportunities for cooperative partner work
- Provide reteach pages if necessary
- Provide several ways to solve a problem if possible
- Provide visual aids and anchor charts
- Test in alternative site
- Tiered lessons and assignments
- Use of a graphic organizer
- Use of concrete materials and objects (manipulatives)
- Use of word processor

Technology Materials and Standards

Technology Materials

- Promethean Board
- Google For Educators
- Google Classroom
- Google Gemini
- MagicSchool
- Canva
- Clever
- Diffit

Technology Literacy Standards

- **TECH.9.4.2.TL.1** Identify the basic features of a digital tool and explain the purpose of the tool.
- **TECH.9.4.2.TL.2** Create a document using a word processing application.
- **TECH.9.4.2.TL.3** Enter information into a spreadsheet and sort the information.
- **TECH.9.4.2.TL.6** Illustrate and communicate ideas and project designs using multiple digital tools.
- **TECH.9.4.2.TL.7** Describe the benefits of collaborating with others to complete digital tasks or develop digital artifacts.

TECH.9.4.2.TL.1	Identify the basic features of a digital tool and explain the purpose of the tool (e.g., 8.2.2.ED.1).
TECH.9.4.2.TL.2	Create a document using a word processing application.
TECH.9.4.2.TL.3	Enter information into a spreadsheet and sort the information.
TECH.9.4.2.TL.6	Illustrate and communicate ideas and stories using multiple digital tools (e.g., SL.2.5.).
TECH.9.4.2.TL.7	Describe the benefits of collaborating with others to complete digital tasks or develop digital artifacts (e.g., W.2.6., 8.2.2.ED.2).

Computer Science and Design Thinking Standards

Computer Science and Design Thinking Standards

- **CS.9-12.8.1.12.AP.5** Decompose problems into smaller components using systematic analysis.
- C**S.9-12.8.1.12.AP.6** Create artifacts by combining data and procedures.
- **CS.9-12.8.1.12.CS.3** Compare the functions of application software, system software, and hardware.
- **CS.9-12.8.2.12.ED.1** Use research to design and create a product that addresses a problem.
- **CS.9-12.8.2.12.ED.2** Create scaled engineering drawings for a project.

CS.9-12.8.1.12.AP.5	Decompose problems into smaller components through systematic analysis, using constructs such as procedures, modules, and/or objects.
CS.9-12.8.1.12.AP.6	Create artifacts by using procedures within a program, combinations of data and procedures, or independent but interrelated programs.
CS.9-12.8.1.12.CS.3	Compare the functions of application software, system software, and hardware.
CS.9-12.8.2.12.ED.1	Use research to design and create a product or system that addresses a problem and make modifications based on input from potential consumers.
CS.9-12.8.2.12.ED.2	Create scaled engineering drawings for a new product or system and make modification to increase optimization based on feedback.