CTE/ROP Introduction to Plumbing 1/2

San Diego County Office of Education - Sweetwater Union High School District
Pacing Guide/Course Description

Course Length: 2 Semesters	**Classroom Instruction:** 180 hours
SUHSD Course Number: 97297/97298	**Grade Level:** 9, 10, 11, 12
SDCOE Course Number: 552410	**SDCOE Total Hours:** 300 hours
CBEDS Number/Title: 5524/Plumbing	**Year of Implementation:** 2011
Course Pre-requisites: None	**Articulation (school/credits):** None
CTE Industry Sector: Building Trades and Construction	**CTE Pathway(s):** Engineering & Heavy Construction, Mechanical Construction, Residential & Commercial Construction
Job Titles: Plumber, Residential and Commercial, Drain Technician, General Construction Worker, Building Maintenance Worker, Residential & Commercial Maintenance	
Credential Information: Preliminary or Clear Full-Time Designated Subjects CTE Teaching Credential in Building Trades and Construction	
Required Textbooks: None	
Course Description: This course provides pre-apprentice, entry-level training in building industry trades in mechanical construction and or residential and commercial construction and related areas. Employment possibilities include plumber, residential and commercial plumber, drain technician, general construction worker, and building maintenance worker, residential and commercial maintenance. Instruction will cover safety, plumbing terminology, plumbing math and history, OSHA requirements, foundation design and construction of plumbing systems, plumbing fixture installations, repairs of plumbing systems, pipe, drain waste and vent systems, pipe sizing, materials, uniform plumbing code and green building technologies. Students use equipment which includes various hand and power tools associated with this trade.	

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Semester 1

Unit 1: Introduction
Unit 2: Safety/Hazardous Waste
Unit 3: Math and Measurement
Unit 4: Plumbing History
Unit 5: Hand and Power Tools
Unit 6: Plumbing Terminology
Unit 7: Blue Print Reading/UPC
Unit 8: Plumbing Principals
Unit 9: Drain Waste and Vent
Unit 10: Drainage Systems
Unit 11: Gas Systems
Unit 12: Piping Materials
Unit 13: Plumbing Maintenance
Unit 14: Green Plumbing
Unit 15: All Aspects of Industry
Unit 16: Work Place Skills
Unit 17: Job Acquisition Skills

Semester 2

Unit 1: Introduction
Unit 2: Safety/Hazardous Waste
Unit 3: Math and Measurement
Unit 4: Hand and Power Tools
Unit 5: Advanced Blue Print Reading/UPC
Unit 6: Plumbing Principals
Unit 7: Advanced Drain Waste and Vent
Unit 8: Advanced Drainage Systems
Unit 9: Advanced Gas Systems
Unit 10: Piping Materials
Unit 11: Plumbing Maintenance
Unit 12: Advanced Green Plumbing
Unit 13: Advanced All Aspects of Industry
Unit 14: Work Place Skills
Unit 15: Job Acquisition Skills

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Semester 1 - **Unit 1 – Introduction (2 hours)**			
Competencies	**Standards**	**Suggested Pacing**	**Resources/Materials**
1A – Demonstrates understanding of course outline **1B** - Demonstrates understanding of syllabus **1C** - Demonstrates understanding of student expectations **1D** - Demonstrates understanding of teacher and student assessments	**Career Technical Education:** ***BTC/LT/** **9.1** Understand the characteristics and benefits of teamwork, leadership, and citizenship in the school, community, and workplace settings. **9.3** Understand how to organize and structure work individually and in teams for effective performance and the attainment of goals. **9.5** Understand how to interact with others in ways that demonstrate respect for individual and cultural differences and for the attitudes and feelings of others. ***BTC/CWP/** **A2.1** Use common hand tools and accessories, such as planers, shapers, clamping and gripping tools, pliers, wrenches, wood chisels, hammers, hand saws, and squares, safely and properly. **Core Academic:** ***BTC/C/2.1R/RC/G9-10/** **(2.1)** Analyze the structure and format of functional workplace documents, including the graphics and headers, and explain how authors use the features to achieve their purposes.	**1A** - **30 minutes:** Course outline **1B** - **30 minutes:** Course syllabus **1C** - **30 minutes:** Student expectations **1D** - **30 minutes:** Assessments	**Teacher Resources:** **Textbooks:* 1. Plumbing 2nd Edition by Michael A. Joyce **Student Resources:** **Textbooks:* 1. Plumbing 2nd Edition by Michael A. Joyce

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Semester 1 - **Unit 2 – Safety/Hazardous Waste (10 hours)**			
Competencies	**Standards**	**Suggested Pacing**	**Resources/Materials**
2A - Received safety instruction in the proper use of tools and equipment used in the construction industry. **2B** - Identifies and uses properly power tools commonly used in the construction industry. **2C** - Assembles and uses scaffolding and staging safely. **2D** - Identifies the community, health, safety and environmental issues. **2E** - Identifies elements of storm water pollution prevention program (SWPPP). **2F** - Understands protocol with material that contains or may contain asbestos. **2G** - Received OSHA 10 training certificate.	**Career Technical Education:** ***BTC/CWP/** **A2.1** Use common hand tools and accessories, such as planers, shapers, clamping and gripping tools, pliers, wrenches, wood chisels, hammers, hand saws, and squares, safely and properly. **A3.1** Use portable power tools, such as single and compound miter saws, drills, sanders, saber saws, and routers, safely and appropriately. **A6.3** Understand how to handle and dispose of toxic materials safely and use protective clothing as needed when using lacquers, acetone, thinners, staining materials, and so forth in an environmentally responsible manner. ***BTC/EHCP/** **B2.1** Use the common hand tools of the trade, such as rebar cutters, metal stud cutters/pliers, concrete floats/fresnoes, sheet metal cutters/pliers, saws, hammers, chisels, and wrenches, safely and appropriately. **B5.1** Understand the importance of scaffold and ladder safety. **B5.2** Know the rules and responsibilities of the various governmental safety agencies and their impact on engineering and heavy construction. **B5.3** Understand the importance of worksite safety as it pertains to hazardous waste disposal and procedures for containment of toxic and hazardous materials. **B7.2** Understand environmental regulations that influence engineering and heavy construction projects. ***BTC/HS/**	**2A – 2 hours:** Construction safety **2B – 3 hours:** Safe power tool usage **2C – 1 hour:** Scaffolding safety **2D – 1 hour:** Health and safety **2E – 1 hour:** SWPPP **2F – 1 hour:** Asbestos safety **2G – 1 hour:** OSHA	**Teacher Resources:** **Textbooks:* 1. Plumbing 2nd Edition by Michael A. Joyce **Student Resources:** **Textbooks:* 1. Plumbing 2nd Edition by Michael A. Joyce

	6.1 Know the policies, procedures, and regulations regarding health and safety in the workplace, including employers' and employees' responsibilities. **6.2** Understand critical elements of health and safety practices related to storing, cleaning, and maintaining tools, equipment, and supplies. **6.3** Know procedures for and regulations concerning the handling, storage, and disposal of hazardous materials. **6.4** Know how regulatory agency laws and regulations are created and enforced. **6.5** Evaluate past, present, and future impacts of technological developments on the environment. **Core Academic:** ***BTC/C/2.1R/RC/G9-10/** **(2.6)** Demonstrate use of sophisticated learning tools by following technical directions (e.g., those found with graphic calculators and specialized software programs and in access guides to World Wide Web sites on the Internet).		

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Semester 1 - **Unit 3 – Math and Measurement (5 hours)**			
Competencies	**Standards**	**Suggested Pacing**	**Resources/Materials**
3A- Measures and lays out materials using feet, inches, fractions using standard and metric measurements unit of measurements. **3B**- Demonstrates trade related math computations calculating cubic yards of concrete and square footage of buildings in order to cut lumber per blueprint dimensions.	**Career Technical Education:** ***BTC/CWP/** **A1.3** Convert scaled drawing measurements to full dimensional layout and template applications. **A1.4** Know conventional measurement processes for cabinetmaking and wood products, linear measurements, and conversions of fractions and decimals. ***BTC/EHCP/** **B1.2** Calculate the required materials, such as soils, aggregate, asphalt, concrete, and pipe, for engineering and heavy construction applications. **Core Academic:** ***BTC/A/1.1M/NS/G7/** **(1.3)** Convert fractions to decimals and percents and use these representations in estimations, computations, and applications. ***BTC/A/1.1M/MR/G7/** **(2.8)** Make precise calculations and check the validity of the results from the context of the problem.	**3A- 1 hour:** Measurement and layout **3B- 4 hours:** Trade math	**Teacher Resources:** **Textbooks:* 1. Plumbing 2nd Edition by Michael A. Joyce **Student Resources:** **Textbooks:* 1. Plumbing 2nd Edition by Michael A. Joyce

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Semester 1 – **Unit 4 – Plumbing History (5 hours)**			
Competencies	**Standards**	**Suggested Pacing**	**Resources/Materials**
4A- Understands plumbing history. **4B-** Interprets the need for plumbing systems. **4C-**Demonstrates knowledge of plumbing as it affects society. **4D-** Understands environmental plumbing applications.	**Career Technical Education:** ***BTC/CPM/** **3.5** Understand the past, present, and future trends that affect careers, such as technological developments and societal trends, and the resulting need for lifelong learning. ***BTC/ELR/** **8.4** Understand how social, organizational, and technological systems work. ***BTC/EHCP/** **B7.1** Understand significant historical trends in engineering and heavy construction technology. ***BTC/MCP/** **C7.1** Understand significant historical trends in the construction industry. **Core Academic:** ***BTC/A/1.3HSS/USH/G11/** **(11.5.7)** Discuss the rise of mass production techniques, the growth of cities, the impact of new technologies (e.g., the automobile, electricity), and the resulting prosperity and effect on the American landscape.	**4A- 1 hour:** Historical plumbing applications **4B – 2 hours:** Plumbing systems **4C – 1 hour:** Plumbing and society **4D – 1 hour:** Environmental plumbing	**Teacher Resources:** **Textbooks:* 1. Plumbing 2nd Edition by Michael A. Joyce **Student Resources:** **Textbooks:* 1. Plumbing 2nd Edition by Michael A. Joyce

Semester 1 - **Unit 5 – Hand and Power Tools (10 hours)**			
Competencies	**Standards**	**Suggested Pacing**	**Resources/Materials**
5A- Uses portable power saw. **5B**- Uses power/hand auger equipment. **5C**- Uses power snake equipment. **5D**- Uses drill motors. **5E** -Uses portable power hole saw. **5F**- Uses soldering equipment. **5G** -Uses thread and die machines.	**Career Technical Education:** ***BTC/CWP/** **A3.1** Use portable power tools, such as single and compound miter saws, drills, sanders, saber saws, and routers, safely and appropriately. **A4.1** Understand the proper and safe use of stationary power tools used in the milling process, such as shapers, sanders, joiners, table saws, and band saws. ***BTC/EHCP/** **B3.1** Use portable power tools, such as circular saws, saber saws, reciprocating saws, and straight and right-angle drills, safely and appropriately. **B3.2** Use pneumatic tools, such as jack hammers, rotary hammers, impact wrenches, concrete tampers, framing nail guns, roofing nail guns, and drills, safely and appropriately. ***BTC/RCCP/** **D3.1** Use portable power tools, such as circular saws, table saws, saber saws, drills, planers, and sanders, safely and properly. **D6.2** Understand the processes and materials (e.g., structural, electrical, mechanical, finish) appropriate to the architectural design and residential construction. ***BTC/HS/** **6.1** Know the policies, procedures, and regulations regarding health and safety in the workplace, including employers' and employees' responsibilities. **6.2** Understand critical elements of health and safety practices related to storing, cleaning, and maintaining tools, equipment, and supplies.	**5A- 2 hours:** Know safe handling hand/power tools **5B-5E – 4.5 hours:** Use of power equipment **5F – 2 hours:** Soldering equipment **5G – 1.5 hours:** Threading/cutting pipe	**Teacher Resources:** **Textbooks:* 1. Plumbing 2nd Edition by Michael A. Joyce **Student Resources:** **Textbooks:* 1. Plumbing 2nd Edition by Michael A. Joyce 2. UPC 2009 Edition

	Core Academic: ***BTC/A/1.2S/IE/G9-12/** **(1.a)** Select and use appropriate tools and technology (such as computer-linked probes, spreadsheets, and graphing calculators) to perform tests, collect data, analyze relationships, and display data.		

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Semester 1 - **Unit 6 – Plumbing Terminology (5 hours)**			
Competencies	**Standards**	**Suggested Pacing**	**Resources/Materials**
6A - Demonstrates knowledge of the terminology of major plumbing fittings and parts	**Career Technical Education:** ***BTC/RCCP/** **D6.1** Develop building plans and schedules by using processes common to residential and commercial construction. **D6.4** Understand the phases of residential and commercial construction. **D7.1** Understand significant historical trends in the construction industry. **Core Academic** ***BTC/A/1.4VAPA/VA/ADV/G9-12/** **(4.6)** Develop written criteria for the selection of a body of work from their portfolios that represents significant achievements.	**6A- 5 hours:** Plumbing trade terminology	**Teacher Resources:** **Textbooks:* 1. Plumbing 2nd Edition by Michael A. Joyce **Student Resources:** **Textbooks:* 1. Plumbing 2nd Edition by Michael A. Joyce

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Semester 1 - **Unit 7 – Blue Print Reading/UPC (5 hours)**			
Competencies	**Standards**	**Suggested Pacing**	**Resources/Materials**
7A- Reads and interprets drawings, blueprints and other standard plans used in the plumbing/construction industry. **7B**- Reads and abides by building codes and other regulations pertaining to the plumbing/construction industry. **7C**- Reads, interprets, and draws isometric drawings for all plumbing systems.	**Career Technical Education:** ***BTC/EHCP/** **B4.1 -** Know how to read, understand, and construct projects accurately from commercial specifications and blueprints, ensuring compliance with state and local building codes. **B4.2** - Understand how to estimate the cost of supplies and materials for an engineering and heavy construction project. ***BTC/MCP/** **C4.2** - Understand how to estimate equipment and materials from blueprints and specifications. ***BTC/RCCP/** **D4.1** Interpret and use residential construction blueprints and specifications. **D4.2** Understand how to estimate materials from blueprints and specifications. **D4.3** Understand the sequencing of events for specific construction projects. ***BTC/PSCT/** **5.1** Apply appropriate problem-solving strategies and critical thinking skills to work-related issues and tasks. ***BTC/TKS/** **10.1** Understand construction processes and systems and their importance in construction technology. **Core Academic:** ***BTC/A/1.1M/NS/G7/** **(1.3)**Convert fractions to decimals and percents and use these representations in estimations, computations, and applications. ***BTC/C/2.1R/RC/G9-10/** **(2.1)** Analyze the structure and format of functional workplace documents, including the	**7A- 2 hours:** Blueprint interpretation **7B- 2 hours:** Uniform plumbing code **7C – 1 hour:** Read, interpret, and draws isometric drawings	**Teacher Resources:** **Textbooks:* 1. Plumbing 2nd Edition by Michael A. Joyce **Student Resources:** **Textbooks:* 1. Plumbing 2nd Edition by Michael A. Joyce

	graphics and headers, and explain how authors use the features to achieve their purposes. **(2.6)** Demonstrate use of sophisticated learning tools by following technical directions (e.g., those found with graphic calculators and specialized software programs and in access guides to World Wide Web sites on the Internet). ***BTC/C/2.1R/RC/G11-12/** **(2.3)** Verify and clarify facts presented in other types of expository texts by using a variety of consumer, workplace, and public documents.		

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Semester 1 - **Unit 8 – Plumbing Principals (5 hours)**			
Competencies	**Standards**	**Suggested Pacing**	**Resources/Materials**
8A- Demonstrates knowledge of basic plumbing principals and requirements.	**Career Technical Education:** ***BTC/MCP/** **C1.1** Identify design solutions to given mechanical construction problems. **C1.2** Calculate the required equipment and materials for mechanical construction applications. **C1.3** Convert scaled blueprint drawing measurements to the full dimensions for a given mechanical construction project. **C1.4** Apply conventional construction measurement processes accurately (geometric and trigonometric functions). **Core Academic:** ***BTC/A/1.1M/MR/G7/** **(2.6)** Express the solution clearly and logically by using the appropriate mathematical notation and terms and clear language; support solutions with evidence in both verbal and symbolic work. **(2.8)** Make precise calculations and check the validity of the results from the context of the problem. ***BTC/A/1.1M/GM/G8-12/** **(8.0)** Students know, derive, and solve problems involving the perimeter, circumference, area, volume, lateral area, and surface area of common geometric figures. **(11.0)** Students determine how changes in dimensions affect the perimeter, area, and volume of common geometric figures and solids. **(16.0)** Students perform basic constructions with a straightedge and compass, such as angle bisectors, perpendicular bisectors, and the line parallel to a given line through a point off the line.	**8A – 5 hours:** Introduction to plumbing principals	**Teacher Resources:** **Textbooks:* 1. Plumbing 2nd Edition by Michael A. Joyce **Student Resources:** **Textbooks:* 1. Plumbing 2nd Edition by Michael A. Joyce

Semester 1 - **Unit 9 –Drain Waste and Vents (5 hours)**			
Competencies	**Standards**	**Suggested Pacing**	**Resources/Materials**
9A- Interprets and understands DWV. **9B**- Understands proper drain, waste vent procedures associated with proper pipe sizing. **9C**- Understands all industry procedures and processes for excavation/slope and tie- ins. **9D**-Understands and identifies all safety concerns and procedures associated with trenching.	**Career Technical Education:** ***BTC/MCP/** **C2.1** Use the common hand tools of the trade, such as ladders and safety gear (fall protection), pliers, wire strippers, meters, pipe wrenches, torches, and sheet metal shears and benders, safely and appropriately. **C3.1** Use portable power tools, such as reciprocating saws, saber saws, chain saws, drills, threaders, and benders, safely and appropriately. **C4.1** Know how to read, understand, and construct projects accurately from mechanical construction blueprints and specifications. **C4.2** Understand how to estimate equipment and materials from blueprints and specifications. **C4.3** Understand the sequencing of events for a specific mechanical construction project. **Core Academic:** ***BTC/C/2.1R/RC/G9-10/** **(2.6)** Demonstrate use of sophisticated learning tools by following technical directions (e.g., those found with graphic calculators and specialized software programs and in access guides to World Wide Web sites on the Internet).	**9A – 2 hours:** DWV **9B – 2 hours:** DWV sizing **9C-9D – 1 hour:** Trenching	**Teacher Resources:** **Textbooks:* 1. Plumbing 2nd Edition by Michael A. Joyce **Student Resource:** **Textbooks:* 1. Plumbing 2nd Edition by Michael A. Joyce 2. UPC 2009 Edition

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Semester 1 – **Unit 10 – Drainage Systems (5 hours)**			
Competencies	**Standards**	**Suggested Pacing**	**Resources/Materials**
10A- Demonstrates how drainage systems work and how fittings are used.	**Career Technical Education:** ***BTC/MCP/** **C2.1** Use the common hand tools of the trade, such as ladders and safety gear (fall protection), pliers, wire strippers, meters, pipe wrenches, torches, and sheet metal shears and benders, safely and appropriately. **C3.1** Use portable power tools, such as reciprocating saws, saber saws, chain saws, drills, threaders, and benders, safely and appropriately. **C4.1** Know how to read, understand, and construct projects accurately from mechanical construction blueprints and specifications. **C4.2** Understand how to estimate equipment and materials from blueprints and specifications. **C4.3** Understand the sequencing of events for a specific mechanical construction project. **Core Academic:** ***BTC/C/2.2W/WS/G9-10/** **(1.3)** Use clear research questions and suitable research methods (e.g., library, electronic media, personal interview) to elicit and present evidence from primary and secondary sources.	**10A – 5 hours:** Drainage systems concepts	**Teacher Resources:** **Textbooks:* 1. Plumbing 2nd Edition by Michael A. Joyce **Student Resources:** **Textbooks:* 1. Plumbing 2nd Edition by Michael A. Joyce 2. UPC 2009 Edition

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Semester 1 – **Unit 11 – Gas Systems (5 hours)**			
Competencies	**Standards**	**Suggested Pacing**	**Resources/Materials**
11A-Understands gas safety and safety procedures. **11B**- Demonstrates how gas systems work. **11C**-Understands gas pipe. **11D**-Identifies, by characteristics and size of gas fittings and appliances.	**Career Technical Education:** ***BTC/MCP/** **C1.1** Identify design solutions to given mechanical construction problems. **C1.2** Calculate the required equipment and materials for mechanical construction applications. **C1.3** Convert scaled blueprint drawing measurements to the full dimensions for a given mechanical construction project. **C1.4** Apply conventional construction measurement processes accurately (geometric and trigonometric functions). **C2.1** Use the common hand tools of the trade, such as ladders and safety gear (fall protection), pliers, wire strippers, meters, pipe wrenches, torches, and sheet metal shears and benders, safely and appropriately. **C4.1** Know how to read, understand, and construct projects accurately from mechanical construction blueprints and specifications. **C4.2** Understand how to estimate equipment and materials from blueprints and specifications. **C4.3** Understand the sequencing of events for a specific mechanical construction project. **Core Academic:** ***BTC/C/2.2W/WS/G9-10/** **(1.3)** Use clear research questions and suitable research methods (e.g., library, electronic media, personal interview) to elicit and present evidence from primary and secondary sources.	**11A – 2 hours:** Residential and commercial gas systems **11B – 1 hour:** How gas systems operate **11C – 1 hour:** Gas piping knowledge **11D – 1 hour:** Sizing of gas pipe	**Teacher Resources:** **Textbooks:* 1. Plumbing 2nd Edition by Michael A. Joyce **Student Resources:** **Textbooks:* 1. Plumbing 2nd Edition by Michael A. Joyce 2. UPC 2009 Edition

Semester 1 - **Unit 12 – Piping Materials (5 hours)**			
Competencies	**Standards**	**Suggested Pacing**	**Resources/Materials**
12A - Demonstrates common knowledge of most pipe materials i.e. copper, brass, steel, PVC, and ABS applications. **12B** - Demonstrates solder/welding applications used in the plumbing construction industry.	**Career Technical Education:** ***BTC/MCP/** **C2.1** Use the common hand tools of the trade, such as ladders and safety gear (fall protection), pliers, wire strippers, meters, pipe wrenches, torches, and sheet metal shears and benders, safely and appropriately. **C4.1** Know how to read, understand, and construct projects accurately from mechanical construction blueprints and specifications. **C4.2** Understand how to estimate equipment and materials from blueprints and specifications. **C4.3** Understand the sequencing of events for a specific mechanical construction project. **Core Academic:** ***BTC/A/1.1M/NS/G7/** **(1.3)** Convert fractions to decimals and percents and use these representations in estimations, computations, and applications.	**12A – 3 hours:** Industry piping **12B – 2 hours:** Soldery and brazing	**Teacher Resources:** **Textbooks:* 1. Plumbing 2nd Edition by Michael A. Joyce **Student Resources:** **Textbooks:* 1. Plumbing 2nd Edition by Michael A. Joyce 2. UPC 2009 Edition

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Semester 1 – **Unit 13 – Plumbing Maintenance (5 hours)**			
Competencies	**Standards**	**Suggested Pacing**	**Resources/Materials**
13A – Installs, repairs, and replaces plumbing fixtures, water heaters and installs appliances. **13B** - Installs repairs (rough-In) waste and water supply.	**Career Technical Education:** ***BTC/MCP/** **C4.5** Understand industry conventions for the creation and maintenance of construction logs. **C4.6** Know the importance of customer service/relations as applied to project management and wholesale and retail sales. **C5.1** Understand the safe use of electrical materials and electrical connection procedures. **Core Academic:** ***BTC/A/1.1M/MR/G7/** **(2.2)** Apply strategies and results from simpler problems to more complex problems. **(3.2)** Note the method of deriving the solution and demonstrate a conceptual understanding of the derivation by solving similar problems. ***BTC/A/1.1M/GM/G8-12/** **(8.0)** Students know, derive, and solve problems involving the perimeter, circumference, area, volume, lateral area, and surface area of common geometric figures.	**13A – 2.5 hours:** Plumbing repairs **13B – 2.5 hours:** Plumbing rough	**Teacher Resources:** **Textbooks:* 1. Plumbing 2nd Edition by Michael A. Joyce **Student Resources:** **Textbooks:* 1. Plumbing 2nd Edition by Michael A. Joyce 2. UPC 2009 Edition

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Semester1 – **Unit 14 – Green Plumbing (5 hours)**			
Competencies	**Standards**	**Suggested Pacing**	**Resources/Materials**
14A- Water **14B**-Energy 1**4C**-Practices and Materials **14D**-Indoor Environmental quality **14E**-Furniture	**Career Technical Education:** ***BTC/HS/** **6.5** Evaluate past, present, and future impacts of technological developments on the environment. ***BTC/TKS/** **10.1** Understand construction processes and systems and their importance in construction technology. **Core Academic:** ***BTC/A/1.3HSS/WH/G10/** **(10.3)** Students analyze the effects of the Industrial Revolution in England, France, Germany, Japan, and the United States. **(10.3.5)** Understand the connections among natural resources, entrepreneurship, labor, and capital in an industrial economy.	**14A – 2 hours:** Green plumbing resources **14B – 1 hour:** Energy **14C – 1 hour:** Practices **14D – 1 hour:** Water saving plumbing fixtures	**Teacher Resources:** **Textbooks:* 1. Plumbing 2nd Edition by Michael A. Joyce **Student Resources:** **Textbooks:* 1. Plumbing 2nd Edition by Michael A. Joyce 2. UPC 2009 Edition 3. UPC 2010 Supplement Green Edition

Semester 1 – **Unit 15- All Aspects of Plumbing Industry (5 hours)**			
Competencies	**Standards**	**Suggested Pacing**	**Resources/Materials**
15A-Understands the underlying principles of technology **15B**-Works on teams, teaches others, serves customers, leads, negotiates and works well with people from culturally diverse background. **15C**-Acquires and evaluates data, organizes and maintains files, interprets and communicates information as well as uses computer to process information. **15D**-Selects equipment and tools, applies technology to specific tasks and maintains and troubleshoots equipment. **15E**-Follow safety procedures and practices.	**Career Technical Education:** ***BTC/CWP/** **A9.2** Understand the need for professional growth across all aspects of the industry, including financial, leadership, and advancement elements. ***BTC/EHCP/** **B4.2** Understand how to estimate the cost of supplies and materials for an engineering and heavy construction project. ***BTC/RCCP/** **D4.2** Understand how to estimate materials from blueprints and specifications. **D4.3** Understand the sequencing of events for specific construction projects. **D4.5** Understand industry conventions for the creation and maintenance of construction logs. **D5.2** Know the safety procedures and practices in various work environment settings pertaining to residential and commercial construction. **D6.1** Develop building plans and schedules by using processes common to residential and commercial construction. **D6.4** Understand the phases of residential and commercial construction. **D7.2** Develop financial plans for construction projects. **D7.3** Understand the environmental regulations that influence residential and commercial design. **(1.6)** Calculate the percentage of increases and decreases of a quantity. ***BTC/PSCT/** **5.1** Apply appropriate problem-solving strategies and critical thinking skills to work-	**15A – 1 hour:** Plumbing principles **15B – 1 hour:** Teamwork **15C – 1 hour:** Communication **15D – 1 hour:** Troubleshooting **15E – 1 hour:** Safety procedures	**Teacher Resources:** **Textbooks:* 1. Plumbing 2nd Edition by Michael A. Joyce **Student Resources:** **Textbooks:* 1. Plumbing 2nd Edition by Michael A. Joyce

	related issues and tasks. ***BTC/HS/** **6.1** Know the policies, procedures, and regulations regarding health and safety in the workplace, including employers' and employees' responsibilities. ***BTC/ELR/** **8.2** Understand the concept and application of ethical and legal behavior consistent with workplace standards. **8.4** Understand how social, organizational, and technological systems work. ***BTC/TKS/** **10.1** Understand construction processes and systems and their importance in construction technology. **10.10** Understand the need to obtain and maintain industry-standard, technical certifications significant to an industry sector. **Core Academic:** ***BTC/A/1.1M/NS/G7/** **(1.1)** Read, write, and compare rational numbers in scientific notation (positive and negative powers of 10) with approximate numbers using scientific notation.		

Semester 1 – **Unit 16 – Work Place Skills (3 hours)**			
Competencies	**Standards**	**Suggested Pacing**	**Resources/Materials**
16A - Accesses and utilizes technology and information. **16B** - Practices occupational safety standards. **16C** - Thinks critically and solves problems effectively. **16D** - Uses basic skills in reading, writing, mathematics, listening and speaking as they relate to occupation specific skills. **16E** - Attains a comprehensive understanding of all aspects of industry the individual is preparing to enter. **16F**- Applies knowledge to real world problems and situations.	**Career Technical Education:** ***BTC/TC/** **4.1** Understand past, present, and future technological advances as they relate to a chosen pathway. **4.2** Understand the use of technological resources to gain access to, manipulate, and produce information, products, and services. **4.3** Understand the influence of current and emerging technology on selected segments of the economy. **4.4** Understand ways in which raw materials are collected and processed to produce industrial materials. ***BTC/HS/** **6.1** Know the policies, procedures, and regulations regarding health and safety in the workplace, including employers' and employees' responsibilities. **6.5** Evaluate past, present, and future impacts of technological developments on the environment. **6.6** Understand the importance of identifying health and safety problems as well as asking for help or approaching supervisors to discuss concerns. ***BTC/PSCT/** **5.1** Apply appropriate problem-solving strategies and critical thinking skills to work-related issues and tasks. **5.2** Understand the systematic problem-solving models that incorporate input, process, outcome, and feedback components. **5.3** Use critical thinking skills to make informed decisions and solve problems. **5.4** Apply trouble-shooting strategies, including failure-analysis procedures, in three-	**16A – 30 minutes:** Technology and information **16B – 30 minutes:** Safety standards **16C – 30 minutes:** Critical thinking and solving problems **16D – 30 minutes:** Basic skills in reading, writing, mathematics, listening and speaking **16E – 30 minutes:** All aspects of industry **16F – 30 minutes:** Real world problems and situations	**Teacher Resources:** **Textbooks:* 1. Plumbing 2nd Edition by Michael A. Joyce **Student Resources:** **Textbooks:* 1. Plumbing 2nd Edition by Michael A. Joyce

	dimensional product material and design work. **5.5** Apply the design process in the design, development, evaluation, and refinement of a prototype for a construction industry product. **Core Academic:** ***BTC/A/1.1M/NS/G7/** **(1.1)** Read, write, and compare rational numbers in scientific notation (positive and negative powers of 10) with approximate numbers using scientific notation. **(1.2)** Add, subtract, multiply, and divide rational numbers (integers, fractions, and terminating decimals) and take positive rational numbers to whole-number powers. **(1.7)** Solve problems that involve discounts, markups, commissions, and profit and compute simple and compound interest. ***BTC/A/1.1M/A1/G8-12/** **(15.0)** Students apply algebraic techniques to solve rate problems, work problems, and percent mixture problems. ***BTC/A/1.1M/GM/G8-12/** **(12.0)** Students find and use measures of sides and of interior and exterior angles of triangles and polygons to classify figures and solve problems.		

CTE/ROP Introduction to Plumbing 1/2

Semester 1 – **Unit 17 – Job Acquisition Skills (5 hours)**			
Competencies	**Standards**	**Suggested Pacing**	**Resources/Materials**
17A - Completes an appropriate resume and job application. **17B** - Acquires job interview techniques. **17C** - Attains awareness of advanced career and educational opportunities **17D**- Writes cover letter and business correspondence. .	**Career Technical Education:** ***BTC/CWP/** **A9.1** Understand the careers that are available in cabinetmaking and wood products manufacturing and related occupations (e.g., custom crafts, furniture making, marketing). ***BTC/RCCP/** **D1.1** Identify design solutions for residential construction problems. **D1.5** Know the use of conventional construction formulas to determine production requirements. **D4.4** Solve common residential construction problems, such as framing, plumbing, and electrical, by using the official codes adopted by the state and local building standards commission. **D5.2** Know the safety procedures and practices in various work environment settings pertaining to residential and commercial construction. **D6.4** Understand the phases of residential and commercial construction. **D7.1** Understand significant historical trends in the construction industry. ***BTC/PSCT/** **5.1** Apply appropriate problem-solving strategies and critical thinking skills to work-related issues and tasks. **5.3** Use critical thinking skills to make informed decisions and solve problems. ***BTC/HS/** **6.1** Know the policies, procedures, and regulations regarding health and safety in the workplace, including employers' and employees' responsibilities.	**17A – 2 hours:** Resume and job application **17B – 1 hour:** Job interview techniques **17C – 1 hour:** Advanced careers and educational opportunities **17D – 1 hour:** Cover letter, thank you letter, follow-up letter	**Teacher Resources:** **Textbooks:* 1. Plumbing 2nd Edition by Michael A. Joyce **Student Resources:** **Textbooks:* 1. Plumbing 2nd Edition by Michael A. Joyce

	***BTC/TKS/** **10.10** Understand the need to obtain and maintain industry-standard, technical certifications significant to an industry sector. **Core Academic:** ***BTC/A/1.1M/NS/G7/** **(1.1)** Read, write, and compare rational numbers in scientific notation (positive and negative powers of 10) with approximate numbers using scientific notation. ***BTC/C/2.2W/WSA/G11-12/** **(2.5)** Write job applications and résumés: **a**. Provide clear and purposeful information and address the intended audience appropriately. **b**. Use varied levels, patterns, and types of language to achieve intended effects and aid comprehension. **c**. Modify the tone to fit the purpose and audience. **d**. Follow the conventional style for that type of document (e.g., résumé, memorandum) and use page formats, fonts, and spacing that contribute to the readability and impact of the document.		

CTE/ROP Introduction to Plumbing 1/2

Semester 2- **Unit 1 – Introduction (0 hours)**			
Competencies	**Standards**	**Suggested Pacing**	**Resources/Materials**
1A – Demonstrates understanding of course outline **1B** - Demonstrates understanding of syllabus **1C** - Demonstrates understanding of student expectations **1D** - Demonstrates understanding of teacher and student assessments	**Career Technical Education:** ***BTC/LT/** **9.1** Understand the characteristics and benefits of teamwork, leadership, and citizenship in the school, community, and workplace settings. **9.3** Understand how to organize and structure work individually and in teams for effective performance and the attainment of goals. **9.5** Understand how to interact with others in ways that demonstrate respect for individual and cultural differences and for the attitudes and feelings of others. ***BTC/CWP/** **A2.1** Use common hand tools and accessories, such as planers, shapers, clamping and gripping tools, pliers, wrenches, wood chisels, hammers, hand saws, and squares, safely and properly. **Core Academic:**	**1A** - **30 minutes:** Course outline **1B** - **30 minutes:** Course syllabus **1C** - **30 minutes:** Student expectations **1D** - **30 minutes:** Assessments	**Teacher Resources:** **Textbooks:* 1. Plumbing 2nd Edition by Michael A. Joyce **Student Resources:** **Textbooks:* 1. Plumbing 2nd Edition by Michael A. Joyce

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Semester 2 - **Unit 2 – Safety/Hazardous Waste (5 hours)**			
Competencies	**Standards**	**Suggested Pacing**	**Resources/Materials**
2A- Received safety instruction in the proper use of tools and equipment used in construction industry. **2B** – Identifies and uses properly power tools commonly used in the construction industry. **2D** – Identifies the community, health, safety, and environmental issues. **2E** – Identifies elements of storm water pollution prevention program (SWPPP). **2H** – Understands personal safety gear including harnesses. **2I** – Understands Tailgate Safety meetings.	**Career Technical Education:** ***BTC/CWP/** **A2.1** Use common hand tools and accessories, such as planers, shapers, clamping and gripping tools, pliers, wrenches, wood chisels, hammers, hand saws, and squares, safely and properly. **A3.1** Use portable power tools, such as single and compound miter saws, drills, sanders, saber saws, and routers, safely and appropriately. **A6.3** Understand how to handle and dispose of toxic materials safely and use protective clothing as needed when using lacquers, acetone, thinners, staining materials, and so forth in an environmentally responsible manner. ***BTC/EHCP/** **B2.1** Use the common hand tools of the trade, such as rebar cutters, metal stud cutters/pliers, concrete floats/fresnoes, sheet metal cutters/pliers, saws, hammers, chisels, and wrenches, safely and appropriately. **B5.1** Understand the importance of scaffold and ladder safety. **B5.2** Know the rules and responsibilities of the various governmental safety agencies and their impact on engineering and heavy construction. **B5.3** Understand the importance of worksite safety as it pertains to hazardous waste disposal and procedures for containment of toxic and hazardous materials. **B7.2** Understand environmental regulations that influence engineering and heavy construction projects. ***BTC/HS/**	**2A – 1 hour:** Construction safety **2B – 1 hour:** Safe power tool usage **2D – 1 hour:** Health and safety **2E – 1 hour:** SWPPP **2H – 30 minutes:** Personal safety **2I – 30 minutes:** Tailgate Safety	**Teacher Resources:** **Textbooks:* 1. Plumbing 2nd Edition by Michael A. Joyce **Student Resources:** **Textbooks:* 1. Plumbing 2nd Edition by Michael A. Joyce

	6.1 Know the policies, procedures, and regulations regarding health and safety in the workplace, including employers' and employees' responsibilities. **6.2** Understand critical elements of health and safety practices related to storing, cleaning, and maintaining tools, equipment, and supplies. **6.3** Know procedures for and regulations concerning the handling, storage, and disposal of hazardous materials. **6.4** Know how regulatory agency laws and regulations are created and enforced. **6.5** Evaluate past, present, and future impacts of technological developments on the environment. **Core Academic:** ***BTC/C/2.1R/RC/G9-10/** **(2.6)** Demonstrate use of sophisticated learning tools by following technical directions (e.g., those found with graphic calculators and specialized software programs and in access guides to World Wide Web sites on the Internet).		

Semester 2 - **Unit 3 – Math and Measurement (10 hours)**			
Competencies	**Standards**	**Suggested Pacing**	**Resources/Materials**
3A – Measures and lays out materials using feet, inches, fractions using standard and metric measurements unit of measurement. **3B** – Demonstrates trade related math computations calculating cubic yards of concrete and square footage of buildings in order to cut lumber per blueprint dimensions.	**Career Technical Education:** ***BTC/CWP/** **A1.3** Convert scaled drawing measurements to full dimensional layout and template applications. **A1.4** Know conventional measurement processes for cabinetmaking and wood products, linear measurements, and conversions of fractions and decimals. ***BTC/EHCP/** **B1.2** Calculate the required materials, such as soils, aggregate, asphalt, concrete, and pipe, for engineering and heavy construction applications. **Core Academic:** ***BTC/A/1.1M/NS/G7/** **(1.3)** Convert fractions to decimals and percents and use these representations in estimations, computations, and applications. ***BTC/A/1.1M/MR/G7/** **(2.8)** Make precise calculations and check the validity of the results from the context of the problem.	**3A – 5 hours:** Measurement and layout **3B – 5 hours:** Trade math	**Teacher Resources:** **Textbooks:* 1. Plumbing 2nd Edition by Michael A. Joyce **Student Resources:** **Textbooks:* 1. Plumbing 2nd Edition by Michael A. Joyce

Semester 2 - **Unit 4 – Hand and Power Tools (5 hours)**			
Competencies	**Standards**	**Suggested Pacing**	**Resources/Materials**
5A – Uses portable power saw. **5C** – Uses power/hand auger equipment. **5E** – Uses power snake equipment. **5F** – Uses drill motors. **5G** – Uses portable power hole saw. **5H** – Uses reamers, cutters, ladders. **5I** – Uses soldering equipment. **5L** – Uses thread and die machines.	**Career Technical Education:** ***BTC/CWP/** **A3.1** Use portable power tools, such as single and compound miter saws, drills, sanders, saber saws, and routers, safely and appropriately. **A4.1** Understand the proper and safe use of stationary power tools used in the milling process, such as shapers, sanders, joiners, table saws, and band saws. ***BTC/EHCP/** **B3.1** Use portable power tools, such as circular saws, saber saws, reciprocating saws, and straight and right-angle drills, safely and appropriately. **B3.2** Use pneumatic tools, such as jack hammers, rotary hammers, impact wrenches, concrete tampers, framing nail guns, roofing nail guns, and drills, safely and appropriately. ***BTC/RCCP/** **D3.1** Use portable power tools, such as circular saws, table saws, saber saws, drills, planers, and sanders, safely and properly. **D6.2** Understand the processes and materials (e.g., structural, electrical, mechanical, finish) appropriate to the architectural design and residential construction. ***BTC/HS/** **6.1** Know the policies, procedures, and regulations regarding health and safety in the workplace, including employers' and employees' responsibilities. **6.2** Understand critical elements of health and safety practices related to storing, cleaning, and maintaining tools, equipment, and supplies.	**5A - 30 minutes:** Portable power saw **5C – 30 minutes:** Power/hand auger **5E – 1 hour:** Power snake **5F – 30 minutes:** Drill motors **5G – 30 minutes:** Portable power hole saw **5H – 30 minutes:** Reamers and cutters **5I – 1 hour:** Soldering equipment **5L – 30 minutes:** Tread and die machines	**Teacher Resources:** **Textbooks:* 1. Plumbing 2nd Edition by Michael A. Joyce **Student Resources:** **Textbooks:* 1. Plumbing 2nd Edition by Michael A. Joyce

	Core Academic: ***BTC/A/1.2S/IE/G9-12/** **(1.a)** Select and use appropriate tools and technology (such as computer-linked probes, spreadsheets, and graphing calculators) to perform tests, collect data, analyze relationships, and display data.		

Semester 2 - **Unit 5 – Advanced Blue Print Reading/UPC (5 hours)**			
Competencies	**Standards**	**Suggested Pacing**	**Resources/Materials**
7A - Reads and interprets drawings, blueprints and other standard plans used in the plumbing/construction industry. **7B** - Reads and abides by building codes and other regulations pertaining to the plumbing/construction industry. **7D** - Prepares bid packages from given specifications. **7E** - Schedules labor and materials as needed on various projects relating to the plumbing/construction trade. **7F** - Demonstrates a basic understanding of cost control. **7G** - Budgets materials and labor in order to complete project under bid.	**Career Technical Education:** ***BTC/EHCP/** **B4.1 -** Know how to read, understand, and construct projects accurately from commercial specifications and blueprints, ensuring compliance with state and local building codes. **B4.2** - Understand how to estimate the cost of supplies and materials for an engineering and heavy construction project. ***BTC/MCP/** **C4.2** - Understand how to estimate equipment and materials from blueprints and specifications. ***BTC/RCCP/** **D4.1** Interpret and use residential construction blueprints and specifications. **D4.2** Understand how to estimate materials from blueprints and specifications. **D4.3** Understand the sequencing of events for specific construction projects. ***BTC/C/2.1R/RC/G9-10/** **(2.1)** Analyze the structure and format of functional workplace documents, including the graphics and headers, and explain how authors use the features to achieve their purposes. **(2.6)** Demonstrate use of sophisticated learning tools by following technical directions (e.g., those found with graphic calculators and specialized software programs and in access guides to World Wide Web sites on the Internet). ***BTC/C/2.1R/RC/G11-12/** **(2.3)** Verify and clarify facts presented in other types of expository texts by using a variety of consumer, workplace, and public documents.	**7A – 1 hour:** Blueprint interpretation **7B – 1 hour:** Building codes **7D – 1 hour:** Bid packages **7E – 1 hour:** Scheduling labor and materials **7F – 30 minutes:** Cost control **7G – 30 minutes:** Budgeting	**Teacher Resources:** **Textbooks:* 1. Plumbing 2nd Edition by Michael A. Joyce **Student Resources:** **Textbooks:* 1. Plumbing 2nd Edition by Michael A. Joyce

	***BTC/PSCT/** **5.1** Apply appropriate problem-solving strategies and critical thinking skills to work-related issues and tasks. ***BTC/TKS/** **10.1** Understand construction processes and systems and their importance in construction technology. **Core Academic:** ***BTC/A/1.1M/NS/G7/** **(1.3)**Convert fractions to decimals and percents and use these representations in estimations, computations, and applications.		

Semester 2 - **Unit 6 – Plumbing Principals (5 hours)**			
Competencies	**Standards**	**Suggested Pacing**	**Resources/Materials**
8A - Demonstrates knowledge of basic plumbing principals and requirements.	**Career Technical Education:** ***BTC/MCP/** **C1.1** Identify design solutions to given mechanical construction problems. **C1.2** Calculate the required equipment and materials for mechanical construction applications. **C1.3** Convert scaled blueprint drawing measurements to the full dimensions for a given mechanical construction project. **C1.4** Apply conventional construction measurement processes accurately (geometric and trigonometric functions). **Core Academic:** ***BTC/A/1.1M/MR/G7/** **(2.6)** Express the solution clearly and logically by using the appropriate mathematical notation and terms and clear language; support solutions with evidence in both verbal and symbolic work. **(2.8)** Make precise calculations and check the validity of the results from the context of the problem. ***BTC/A/1.4VAPA/VA/ADV/G9-12/** **(4.6)** Develop written criteria for the selection of a body of work from their portfolios that represents significant achievements.	**8A – 5 hours:** Plumbing principals	**Teacher Resources:** **Textbooks:* 1. Plumbing 2nd Edition by Michael A. Joyce **Student Resources:** **Textbooks:* 1. Plumbing 2nd Edition by Michael A. Joyce

Semester 2 - **Unit 7 –Advanced Drain Waste and Vents (10 hours)**			
Competencies	**Standards**	**Suggested Pacing**	**Resources/Materials**
9A - Interprets and understands DWV. **9B** - Understands proper drain, waste vent procedures associated with proper pipe sizing. **9C** - Understands all industry procedures and processes for excavation/slope and tie- ins.	**Career Technical Education:** ***BTC/MCP/** **C2.1** Use the common hand tools of the trade, such as ladders and safety gear (fall protection), pliers, wire strippers, meters, pipe wrenches, torches, and sheet metal shears and benders, safely and appropriately. **C3.1** Use portable power tools, such as reciprocating saws, saber saws, chain saws, drills, threaders, and benders, safely and appropriately. **C4.1** Know how to read, understand, and construct projects accurately from mechanical construction blueprints and specifications. **C4.2** Understand how to estimate equipment and materials from blueprints and specifications. **C4.3** Understand the sequencing of events for a specific mechanical construction project. **Core Academic:** ***BTC/A/1.1M/NS/G7/** **(1.7)** Solve problems that involve discounts, markups, commissions, and profit and compute simple and compound interest. ***BTC/A/1.1M/GM/G8-12/** **(8.0)** Students know, derive, and solve problems involving the perimeter, circumference, area, volume, lateral area, and surface area of common geometric figures. **(11.0)** Students determine how changes in dimensions affect the perimeter, area, and volume of common geometric figures and solids.	**9A – 6 hours:** DWV **9B – 3 hours:** Pipe sizing **9C – 1 hour:** Industry procedures and processes	**Teacher Resources:** **Textbooks:* 1. Plumbing 2nd Edition by Michael A. Joyce **Student Resources:** **Textbooks:* 1. Plumbing 2nd Edition by Michael A. Joyce

	***BTC/C/2.1R/RC/G9-10/** **(2.6)** Demonstrate use of sophisticated learning tools by following technical directions (e.g., those found with graphic calculators and specialized software programs and in access guides to World Wide Web sites on the Internet).		

Semester 2 – **Unit 8 – Advanced Drainage Systems (5 hours)**			
Competencies	**Standards**	**Suggested Pacing**	**Resources/Materials**
10A - Demonstrates how drainage systems work and how fittings are used.	**Career Technical Education:** ***BTC/MCP/** **C2.1** Use the common hand tools of the trade, such as ladders and safety gear (fall protection), pliers, wire strippers, meters, pipe wrenches, torches, and sheet metal shears and benders, safely and appropriately. **C3.1** Use portable power tools, such as reciprocating saws, saber saws, chain saws, drills, threaders, and benders, safely and appropriately. **C4.1** Know how to read, understand, and construct projects accurately from mechanical construction blueprints and specifications. **C4.2** Understand how to estimate equipment and materials from blueprints and specifications. **C4.3** Understand the sequencing of events for a specific mechanical construction project. **Core Academic:** ***BTC/C/2.2W/WS/G9-10/** **(1.3)** Use clear research questions and suitable research methods (e.g., library, electronic media, personal interview) to elicit and present evidence from primary and secondary sources.	**10A – 5 hours:** Drainage systems	**Teacher Resources:** **Textbooks:* 1. Plumbing 2nd Edition by Michael A. Joyce **Student Resources:** **Textbooks:* 1. Plumbing 2nd Edition by Michael A. Joyce

Semester 2 – **Unit 9 – Advanced Gas Systems (10 hours)**			
Competencies	**Standards**	**Suggested Pacing**	**Resources/Materials**
11A - Understands gas safety and safety procedures. **11B** - Demonstrates how gas systems work. **11C** - Understands gas pipe. **11D** - Identifies, by characteristics and size of gas fittings and appliances.	**Career Technical Education:** ***BTC/MCP/** **C1.1** Identify design solutions to given mechanical construction problems. **C1.2** Calculate the required equipment and materials for mechanical construction applications. **C1.3** Convert scaled blueprint drawing measurements to the full dimensions for a given mechanical construction project. **C1.4** Apply conventional construction measurement processes accurately (geometric and trigonometric functions). ***BTC/MCP/** **C2.1** Use the common hand tools of the trade, such as ladders and safety gear (fall protection), pliers, wire strippers, meters, pipe wrenches, torches, and sheet metal shears and benders, safely and appropriately. **C4.1** Know how to read, understand, and construct projects accurately from mechanical construction blueprints and specifications. **C4.2** Understand how to estimate equipment and materials from blueprints and specifications. **C4.3** Understand the sequencing of events for a specific mechanical construction project. **Core Academic:** ***BTC/C/2.1R/RC/G9-10/** **(2.6)** Demonstrate use of sophisticated learning tools by following technical directions (e.g., those found with graphic calculators and specialized software programs and in access guides to World Wide Web sites on the Internet). ***BTC/C/2.1R/RC/G9-10/** **(2.6)** Demonstrate use of sophisticated	**11A – 1 hour:** Gas safety **11B – 1 hour:** How gas systems work **11C – 2 hours:** Gas piping **11D – 6 hours:** Gas pipe sizing	**Teacher Resources:** **Textbooks:* 1. Plumbing 2nd Edition by Michael A. Joyce **Student Resources:** **Textbooks:* 1. Plumbing 2nd Edition by Michael A. Joyce

	learning tools by following technical directions (e.g., those found with graphic calculators and specialized software programs and in access guides to World Wide Web sites on the Internet). ***BTC/C/2.2W/WS/G9-10/** **(1.3)** Use clear research questions and suitable research methods (e.g., library, electronic media, personal interview) to elicit and present evidence from primary and secondary sources.		

Semester 2 - **Unit 10 – Piping Materials (5 hours)**			
Competencies	**Standards**	**Suggested Pacing**	**Resources/Materials**
12A - Demonstrates common knowledge of most pipe materials i.e. copper, brass, steel, PVC and ABS applications. **12B** - Demonstrates solder/welding applications used in the plumbing construction industry.	**Career Technical Education:** ***BTC/MCP/** **C2.1** Use the common hand tools of the trade, such as ladders and safety gear (fall protection), pliers, wire strippers, meters, pipe wrenches, torches, and sheet metal shears and benders, safely and appropriately. **C4.1** Know how to read, understand, and construct projects accurately from mechanical construction blueprints and specifications. **C4.2** Understand how to estimate equipment and materials from blueprints and specifications. **C4.3** Understand the sequencing of events for a specific mechanical construction project. **Core Academic:** ***BTC/A/1.1M/NS/G7/** **(1.3)** Convert fractions to decimals and percents and use these representations in estimations, computations, and applications.	**12A – 2 hours:** Industry piping **12B – 3 hours:** Solder and welding applications	**Teacher Resources:** **Textbooks:* 1. Plumbing 2nd Edition by Michael A. Joyce **Student Resources:** **Textbooks:* 1. Plumbing 2nd Edition by Michael A. Joyce

Semester 2 – **Unit 11 – Plumbing Maintenance (10 hours)**			
Competencies	**Standards**	**Suggested Pacing**	**Resources/Materials**
13A - Installs, repairs and replaces plumbing fixtures, water heaters and installs appliances **13B** - Installs, repairs (rough-In) waste and water supply.	**Career Technical Education:** ***BTC/MCP/** **C4.5** Understand industry conventions for the creation and maintenance of construction logs. **C4.6** Know the importance of customer service/relations as applied to project management and wholesale and retail sales. **C5.1** Understand the safe use of electrical materials and electrical connection procedures. **Core Academic:** ***BTC/C/2.1R/RC/G9-10/** **(2.6)** Demonstrate use of sophisticated learning tools by following technical directions (e.g., those found with graphic calculators and specialized software programs and in access guides to World Wide Web sites on the Internet). ***BTC/A/1.1M/MR/G7/** **(2.2)** Apply strategies and results from simpler problems to more complex problems. **(3.2)** Note the method of deriving the solution and demonstrate a conceptual understanding of the derivation by solving similar problems. ***BTC/A/1.1M/GM/G8-12/** **(8.0)** Students know, derive, and solve problems involving the perimeter, circumference, area, volume, lateral area, and surface area of common geometric figures.	**13A – 5 hours:** Plumbing repairs **13B – 5 hours:** Plumbing rough	**Teacher Resources:** **Textbooks:* 1. Plumbing 2nd Edition by Michael A. Joyce **Student Resources:** **Textbooks:* 1. Plumbing 2nd Edition by Michael A. Joyce

Semester 2 – **Unit 12 – Advanced Green Plumbing (5 hours)**			
Competencies	**Standards**	**Suggested Pacing**	**Resources/Materials**
14A - Water **14B** - Energy **14C** – Practices and materials **14D** - Indoor environmental quality	**Career Technical Education:** ***BTC/HS/** **6.5** Evaluate past, present, and future impacts of technological developments on the environment. ***BTC/TKS/** **10.1** Understand construction processes and systems and their importance in construction technology. **Core Academic:** ***BTC/A/1.3HSS/WH/G10/** **(10.3)** Students analyze the effects of the Industrial Revolution in England, France, Germany, Japan, and the United States. **(10.3.5)** Understand the connections among natural resources, entrepreneurship, labor, and capital in an industrial economy.	**14A – 2 hours:** Water **14B – 1 hour:** Energy **14C – 1 hour:** Practices and materials **14D – 1 hour:** Environmental quality	**Teacher Resources:** **Textbooks:* 1. Plumbing 2nd Edition by Michael A. Joyce **Student Resources:** **Textbooks:* 1. Plumbing 2nd Edition by Michael A. Joyce

Semester 2 – **Unit 13- Advanced All Aspects of Plumbing Industry (5 hours)**			
Competencies	**Standards**	**Suggested Pacing**	**Resources/Materials**
15D - Understands the underlying principles of technology. **15H** - Works on teams, teaches others, serves customers, leads, negotiates and works well with people from culturally diverse background. **15I** - Acquires and evaluates data, organizes and maintains files, interprets and communicates information as well as uses computer to process information. **15K**- Selects equipment and tools, applies technology to specific tasks and maintains and troubleshoots equipment. **15L** - Follow safety procedures and practices.	**Career Technical Education:** ***BTC/CWP/** **A9.2** Understand the need for professional growth across all aspects of the industry, including financial, leadership, and advancement elements. ***BTC/EHCP/** **B4.2** Understand how to estimate the cost of supplies and materials for an engineering and heavy construction project. ***BTC/RCCP/** **D4.2** Understand how to estimate materials from blueprints and specifications. **D4.3** Understand the sequencing of events for specific construction projects. **D4.5** Understand industry conventions for the creation and maintenance of construction logs. **D5.2** Know the safety procedures and practices in various work environment settings pertaining to residential and commercial construction. **D6.1** Develop building plans and schedules by using processes common to residential and commercial construction. **D6.4** Understand the phases of residential and commercial construction. **D7.2** Develop financial plans for construction projects. **D7.3** Understand the environmental regulations that influence residential and commercial design. **(1.6)** Calculate the percentage of increases and decreases of a quantity. ***BTC/PSCT/** **5.1** Apply appropriate problem-solving strategies and critical thinking skills to work-	**15D – 1 hour:** Principles of technology **15H – 1 hour:** Teamwork **15I – 1 hour:** Data evaluation **15K – 1 hour:** Equipment and tools **15L – 1 hour:** Safety procedures and practices	**Teacher Resources:** **Textbooks:* 1. Plumbing 2nd Edition by Michael A. Joyce **Student Resources:** **Textbooks:* 1. Plumbing 2nd Edition by Michael A. Joyce

	related issues and tasks. ***BTC/HS/** **6.1** Know the policies, procedures, and regulations regarding health and safety in the workplace, including employers' and employees' responsibilities. ***BTC/ELR/** **8.2** Understand the concept and application of ethical and legal behavior consistent with workplace standards. **8.4** Understand how social, organizational, and technological systems work. ***BTC/TKS/** **10.1** Understand construction processes and systems and their importance in construction technology. **10.10** Understand the need to obtain and maintain industry-standard, technical certifications significant to an industry sector. **Core Academic:** ***BTC/A/1.1M/NS/G7/** **(1.1)** Read, write, and compare rational numbers in scientific notation (positive and negative powers of 10) with approximate numbers using scientific notation.		

Semester 2 – **Unit 14 – Work Place Skills (5 hours)**			
Competencies	**Standards**	**Suggested Pacing**	**Resources/Materials**
16L – Demonstrates problem solving skills.	**Career Technical Education:** ***BTC/PSCT/** **5.1** Apply appropriate problem-solving strategies and critical thinking skills to work-related issues and tasks. **5.2** Understand the systematic problem-solving models that incorporate input, process, outcome, and feedback components. **5.3** Use critical thinking skills to make informed decisions and solve problems. **5.4** Apply trouble-shooting strategies, including failure-analysis procedures, in three-dimensional product material and design work. **5.5** Apply the design process in the design, development, evaluation, and refinement of a prototype for a construction industry product. **Core Academic:** ***BTC/A/1.1M/NS/G7/** **(1.1)** Read, write, and compare rational numbers in scientific notation (positive and negative powers of 10) with approximate numbers using scientific notation. **(1.2)** Add, subtract, multiply, and divide rational numbers (integers, fractions, and terminating decimals) and take positive rational numbers to whole-number powers. ***BTC/A/1.1M/MR/G7/** **(2.1)** Use estimation to verify the reasonableness of calculated results.	**16L – 5 hours:** Problem solving	**Teacher Resources:** **Textbooks:* 1. Plumbing 2nd Edition by Michael A. Joyce **Student Resources:** **Textbooks:* 1. Plumbing 2nd Edition by Michael A. Joyce

Semester 2 – **Unit 15 – Job Acquisition Skills (5 hours)**			
Competencies	**Standards**	**Suggested Pacing**	**Resources/Materials**
17A - Completes an appropriate resume and job application. **17B** - Acquires job interview techniques. **17C** - Attains awareness of advanced career and educational opportunities **17D**- Writes cover letter and business correspondence.	**Career Technical Education:** ***BTC/CWP/** **A9.1** Understand the careers that are available in cabinetmaking and wood products manufacturing and related occupations (e.g., custom crafts, furniture making, marketing). ***BTC/RCCP/** **D1.1** Identify design solutions for residential construction problems. **D1.5** Know the use of conventional construction formulas to determine production requirements. **D4.4** Solve common residential construction problems, such as framing, plumbing, and electrical, by using the official codes adopted by the state and local building standards commission. **D5.2** Know the safety procedures and practices in various work environment settings pertaining to residential and commercial construction. **D6.4** Understand the phases of residential and commercial construction. **D7.1** Understand significant historical trends in the construction industry. ***BTC/PSCT/** **5.1** Apply appropriate problem-solving strategies and critical thinking skills to work-related issues and tasks. **5.3** Use critical thinking skills to make informed decisions and solve problems. ***BTC/HS/** **6.1** Know the policies, procedures, and regulations regarding health and safety in the workplace, including employers' and employees' responsibilities.	**17A – 1 hours:** Resume and job application **17B – 2 hour:** Job interview techniques **17C – 1 hour:** Advanced careers and educational opportunities **17D – 1 hour:** Cover letter, thank you letter, follow-up letter	**Teacher Resources:** **Textbooks:* 1. Plumbing 2nd Edition by Michael A. Joyce **Student Resources:** **Textbooks:* 1. Plumbing 2nd Edition by Michael A. Joyce

	***BTC/TKS/** **10.10** Understand the need to obtain and maintain industry-standard, technical certifications significant to an industry sector. **Core Academic:** ***BTC/A/1.1M/NS/G7/** **(1.1)** Read, write, and compare rational numbers in scientific notation (positive and negative powers of 10) with approximate numbers using scientific notation. ***BTC/C/2.2W/WSA/G11-12/** **(2.5)** Write job applications and résumés: **a**. Provide clear and purposeful information and address the intended audience appropriately. **b**. Use varied levels, patterns, and types of language to achieve intended effects and aid comprehension. **c**. Modify the tone to fit the purpose and audience. **d**. Follow the conventional style for that type of document (e.g., résumé, memorandum) and use page formats, fonts, and spacing that contribute to the readability and impact of the document.		