

# **Mercer County Community College**

## **Division of Business and Technology**

### **UTI 102**

#### **Fundamentals of Gas Combustion**

##### **COURSE DESCRIPTION:**

Provides students with the fundamentals of gas combustion, including knowledge and skills to diagnose combustion problems and make the proper adjustments to obtain complete combustion at the rated input using standard tools.

Text:

Handout & Reference Guides

Prerequisites: Approved Math Elective

Credits: 3

Lecture Hours: 2

Studio/Lab Hours 2

Food and drink are strictly prohibited in classrooms as per health and safety laws. Students may not bring in chemicals or cleaning fluids without the appropriate MSD sheets.

Course Coordinator: Dominick DeFino

Revised: 10/23/02

**A.A.S. Degree – Utility Technology**

**Course Objectives:**

- Identify the properties of various fuel gases, i.e. Methane (Natural), Ethane, Propane and Butane
- Identify the chemical structure of the various fuel gases of natural gas
- Describe the principles of combustion
- Recognize the danger of incomplete combustion and make adjustments to eliminate the condition
- Describe the principles of burner operation and the condition that affect normal operation
- To identify the properties of Methane (Natural), Ethane, Propane and Butane
- To identify the chemical structure of natural gas (Called Analysis in AGA Manual)

**Evaluation Procedure:****Grading Criteria for Participants**

The participants will be individual evaluated on the course content utilizing the following criteria:

- |                      |                       |
|----------------------|-----------------------|
| • Attendance         | - Mandatory           |
| • Average of Quizzes | = 30 % of Total Grade |
| • Final Examination  | = 70 % of Total Grade |

**Course/Instructor Evaluation**

The course and instructor evaluation will consist of the following:

- End of Course Reaction Survey which will ask the participant opinion of the course based on within the objectives and outline
- Overall performance of as indicated by participants completion of quizzes, practical & laboratory exercises and final exam
- Instructor observations by PSE&G – Technical Training team to ensure consistence of instructional quality

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**Course: Fundamentals of Gas Combustion ~ Topical Outline**

- I. Appliance Service Apprentice Training Introduction and Overview
  - a. Introductions
  - b. Overview of Training Program
  - c. Technical Training Guidelines
  - d. PSE&G Safety Culture
  - e. Using Technical References
  
- II. Combustion Introduction and Overview
  - a. Present Course Topics
  - b. Present Course and Enabling Objectives
  
- III. Gas Properties
  - a. General Gas Properties
  - b. Methane (Natural) Ethane, Propane, or Butane
  
- IV. Gas Combustion
  - a. Define Combustion
  - b. Demonstrate Limits of Flammability
  - c. Complete and Incomplete Combustion
  - d. Carbon Monoxide Detection and Testing
  
- V. Burners
  - a. Safety
  - b. Burner Identification, Types, Components
  - c. Burner Operation
  - d. Calculating British Thermal Unit (BTU)/(CFH)
  - e. Using the PSE&G Gas Flow Chart
  
- VI. Burner Orifices
  - a. Safety
  - b. Orifice Identification, Types and Operation
  - c. Measuring Gas Input and Flow
  - d. Measuring Utilization Gas Pressure
  - e. Sizing Orifices
  
- VII. Venting
  - a. Safety
  - b. Basic Concepts
  - c. Use of National Fuel Gas Code book (NFPA-54)
  
- VIII. Burner Problems
  - a. Safety
  - b. Types
  - c. Troubleshooting – Hands-on Practice
  - d. Clocking the Meter
  - e. Use of Manometer
  
- IX. Practice Exercises (pg. 86)
  - a. Determine Input and Pressure
  - b. Cleaning Orifices
  - c. Drilling an Orifice

