

COURSE OUTLINE**Industrial Technology 200  
NATE CERTIFICATION CORE TRAINING****I. Catalog Statement**

Industrial Technology 200 examines the core technical knowledge required to become a North American Technician Excellence (NATE) certified technician. The course emphasizes the basic physics and electrical theory required to be a qualified technician. The course covers heating, ventilation, air conditioning and refrigeration specific knowledge in the areas of safety, tools, heat transfer/comfort and electrical systems.

Units - 2.0

Lecture Hours - 2.0

Recommended Preparation: Eligibility for English 120 or ESL 151.

**II. Course Entry Expectations**

Skill Level Ranges: Reading 5; Writing 5; Listening/Speaking 5; Math 1.

**III. Course Exit Standards**

Upon successful completion of the required coursework, the student will be able to:

1. identify the procedures essential to successful trouble shooting;
2. identify heating and air-conditioning systems having minimal environmental impact;
3. describe state of the art leak detection and system evacuation procedures;
4. successfully complete NATE core certification.

**IV. Course Content****Total Contact Hours = 32**

A. Core General Skills	2 hours
1. Safety	
2. Tools	
B. Electrical Skills	5 hours
1. Electricity, magnetism, and power theory	
2. Factor conductors	
3. Electric meters and motors	
4. Electrical symbols and schematic diagrams	
5. Transformers	
6. Thermostats	

C. Introduction to Gas Heating	4 hours
1. Furnace basics	
2. Fuels and furnace types	
3. Incomplete combustion	
4. Furnace components	
5. Flame igniters and flame sensing	
D. Installation and Service of Gas Heating	2 hours
1. National fuel gas code and energy savings	
2. Furnace installation and maintenance	
3. Furnace controls	
4. Troubleshooting concepts	
E. Introduction to Air Conditioners and Heat Pumps	5 hours
1. Two laws of thermodynamics	
2. Basic gas/liquid, temperature/pressure relationships	
3. Superheat and subcooling concepts	
4. Heat and refrigerant flow	
5. Basic refrigeration components	
6. Refrigerant and oil types	
7. Heat pump components	
F. Air Conditioners and Heat Pumps, Installation and Service	4 hours
1. Split system equipment/split refrigeration systems	
2. Refrigeration line installation	
3. Nitrogen purging and brazing	
4. Refrigerant leak detection and refrigeration system evacuation	
5. Refrigerant charging procedures	
6. Condensate drain lines	
G. Introduction to Air Distribution	4 hours
1. Properties of air	
2. Psychometric charts	
3. Airflow tools and airflow measurements	
4. Fan laws and fans	
H. Air Distribution Installation and Service	4 hours
1. Air side economizers	
2. Demand control ventilation	
3. Sheet metal ducting and tools	
4. Air duct systems	
5. Ductboard assembly	
I. Air Balancing	2 hours
1. Duct system design	
2. Maintenance	

**V. Methods of Presentation**

The following instructional methodologies may be used in the course:

1. lecture;
2. demonstrations;

3. multi-media;
4. guest speakers.

## **VI. Methods of Evaluation**

The following assignments and methods of evaluation may be used in the course:

1. quizzes;
2. final examination.

## **VII. Assignments**

1. performance projects; (e.g. construct a troubleshooting diagram with a written description of tasks for each maintenance system throughout the course; electrical, gas, and air. Charts should represent a well-considered order of operations relative to personal efficiency, urgency, and frequency of possible error.
2. essay. (e.g. describe the physics laws that affect maintenance systems and make unique personal analogies or life references not specific to industrial technology.)

## **VII. Textbook**

IHACI - NATE Training Series. 2011  
Institute of Heating and Air Conditioning Industries, Inc.  
454 West Broadway, Glendale, Ca 91204

## **VIII. Student Learning Outcomes**

1. Student will identify the procedures essential to successful trouble shooting.
2. Student will understand leak detection and system evacuation procedures.
3. Student will be prepared to complete and pass NATE certification.
4. Student will understand gas heating and air-conditioning systems that incorporate environmental factors.

