A. **TITLE:** Refrigeration & Air Conditioning Service II

B. **COURSE NUMBER:** ACHP 104

C. **CREDIT HOURS:** (7)

D. **WRITING INTENSIVE COURSE:** No

E. **COURSE LENGTH:** (15 weeks)

F. **SEMESTER(S) OFFERED:** Spring

G. **HOURS OF LECTURE, LABORATORY, RECITATION, TUTORIAL, ACTIVITY:**

   4 hours lecture, 9 hours lab per week

H. **CATALOG DESCRIPTION:** Applications of refrigeration and air conditioning systems are presented along with heat gain calculation, air distribution and filtration, and controls. Complete systems including split DX air conditioners, heat pumps, and packaged systems are installed. Some sheet metal layout and fabrication is also performed. Four hours lecture, nine hours laboratory per week

I. **PRE-REQUISITES/CO-REQUISITES:** Refrigeration and Air Conditioning Services I (ACHP 103) or permission of instructor.

J. **GOALS (STUDENT LEARNING OUTCOMES):**

   By the end of this course, the student will be able to:

<table>
<thead>
<tr>
<th>Course Objective</th>
<th>Institutional SLO</th>
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<tbody>
<tr>
<td>a. Demonstrate procedures for evacuating and recharging a refrigeration system</td>
<td>3. Prof. Competence</td>
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<tr>
<td>b. Explain system equilibrium and discuss factors in balancing commercial and</td>
<td>3. Prof. Competence</td>
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<tr>
<td>residential systems</td>
<td>2. Critical Thinking</td>
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<tr>
<td>c. Read and interpret psychrometric charts</td>
<td>2. Critical Thinking</td>
</tr>
<tr>
<td>d. Use various instruments to measure air properties</td>
<td>3. Prof. Competence</td>
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<tr>
<td>e. Demonstrate proper installation and service of refrigeration and air</td>
<td>3. Prof. Competence</td>
</tr>
<tr>
<td>conditioning systems</td>
<td>1. Communication</td>
</tr>
<tr>
<td>f. Identify regulations and codes imposed on refrigeration technicians</td>
<td>3. Prof. Competence</td>
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L. **REFERENCES:** N/A

M. **EQUIPMENT:** Refrigeration tool list
N. **GRADING METHOD:** (A-F)

O. **MEASUREMENT CRITERIA/METHODS:**
   - Exams
   - Quizzes
   - Lab Reports
   - Participation

P. **DETAILED COURSE OUTLINE:**
   I. Residential Systems
      A. System Types
      B. Air Cooled Units
      C. Evaporators
      D. Heat Exchangers
      E. Controls
      F. Valves
      G. Compressor Protection
      H. Refrigerant Lines
   II. Servicing and Installing Systems
      A. Component Installation
      B. Electrical Installation
      C. Leak Detection
      D. Evacuating and Charging
      E. Refrigerant Reclaiming
      F. Service Equipment
      G. Servicing Units
      H. Compressor Service
      I. Condenser-Evaporator Service
      J. Valve Service
      K. Moisture Problems
      L. Compressor Burnout
      M. Electrical Service
      N. Troubleshooting
   III. Heat Loads and Piping
      A. Heat Load Variables
      B. K Factor
      C. Air Change Load
      D. Product Load
      E. Conduction Load
      F. Computing Total Heat Load
      G. Component Capacity
      H. Component Location
      I. Sizing Calculations
      J. Cycle Thermodynamics
      K. Effective Latent heat
      L. Coefficient of Performance
      M. Sizing Suction Lines
      N. Sizing Discharge Lines
   IV. Fundamentals of Air Conditioning
A. Air Properties
B. Humidity
C. Psychometrics
D. Velocity Pressure
E. Air Velocity Measurement
F. Ventilation
G. Heat Load Fundamentals
H. Air Quality and Filtration
I. Insulation and Vapor Barriers

V. Basic Air Conditioning Systems
A. Furnaces and Heat Distribution
B. Central Cooling Units
C. Heat Pumps

VI. Cooling and Dehumidifying
A. Cooling Principles
B. Cooling Cycle
C. Cooling Equipment
D. Split Systems
E. Dehumidifying

VII. Distribution, Filtration and Instrumentation
A. Conditions of Air
B. Ventilation Requirements
C. Duct Sizes and Types
D. Air Volume Calculations
E. Room Air Movement
F. Return Air
G. System Balancing
H. Air Volume Measurement
I. Electric Meters

VIII. Central Air and Heat Pump Systems
A. Complete Outdoor Systems
B. Rooftop Systems
C. Split Systems
D. Heat Pump Theory and Operation
E. Heat Pump Systems
F. Installation and Service

IX. Control Systems
A. Controllers
B. Thermostats
C. Relays
D. Limits
E. Control Circuits
F. Split System Controls
G. Control Servicing

X. Cooling Loads
A. Heat Transfer
B. U and R Factors
C. Design Temperature
D. Infiltration and Ventilation
E. Internal Heat Gain
F. Total Cooling Loads
G. Equipment Selection

XI. EPA Requirements
   A. CFC’s and The Ozone Layer
   B. Replacement Refrigerants
   C. Refrigerant Recovery

Q. LABORATORY OUTLINE:

I. Pressure/Thermal switches
   A. Pressure switches
   B. Thermal switches

II. Enthalpy Performance

III. See
   A. Heating
   B. Cooling

IV. Defrost
   A. Passive
   B. Hot Gas/Electric

V. Equipment Projects
   A. Walk in cooler
   B. Split AC Installation
   C. Ice Makers
   D. Refrigerators
   E. Heat Pumps
   F. Water Fountains
   G. Chillers
   H. Gas furnaces
   I. Dehumidifiers
   J. Other equipment as opportunity provides