FLORIDA STATE COLLEGE AT JACKSONVILLE

NON-COLLEGE CREDIT COURSE OUTLINE

COURSE NUMBER:	ACR 0002
COURSE TITLE:	Air Conditioning and Refrigeration Theory II
PREREQUISITE(S):	ACR 0001
COREQUISITE(S):	None
TOTAL CONTACT HOURS:	125 (112-138)
(For Office Use Only: Vocational Credits _4.0__)	
FACULTY WORKLOAD POINTS:	4.16
STANDARDIZED CLASS SIZE ALLOCATION:	20

COURSE DESCRIPTION:

This course is a continuation of Air Conditioning and Refrigeration Theory I and is designed to teach entry-level job skills. Topics include basic refrigeration cycle, valves, accessories, piping dehydration, charging, discharging, installation procedures, multiple systems, troubleshooting, business ethics, employee and employer responsibilities, personal and industrial safety, and compressors.

SUGGESTED TEXT(S):	Principles of Air Conditioning, Delmar Publishers, V. Paul Lang, Copyright 1995 Refrigeration and Air Conditioning Technology, 4th edition, Whitman – Johnson – Tomczyk, Copyright 2000
IMPLEMENTATION DATE:	Fall Term, 1989
REVIEW OR MODIFICATION DATE:	Fall Term, 1998 Fall Term, 2002 (20031)

COURSE TOPICS	CONTACT HOURS PER TOPIC
I. Piping	13
A. Safety as it applies to piping	
B. Requirements	
C. Line names and functions	
D. Design factors	
E. Insulation and hangers	
F. Copper tubing and pipes	
G. Piping pressure drops	
II. Dehydration	12
A. Moisture	
B. Effects	
C. Determination	
D. Removal	
E. Driers	
F. Evacuation	
G. Improper drying	
H. Sludge	
III. Charging and Discharging System	12
A. Adding and removing	
B. Methods	
C. Measurements	
D. Equipment	
E. Precautions	
IV. Multiple Systems	12
A. Compressors	
B. Evaporators	
C. Condensers	
D. Metering devices	
E. Oil return	
V. Installation Procedures	12
A. Equipment placement	
B. Air movement	
C. Service accessibility	
D. Vibration isolation	
E. Piping	
F. Soft copper	
G. Hard copper	

COURSE TOPICS	CONTACT HOURS PER TOPIC
VI. Troubleshooting	12
A. Condensers	
B. Basic cycle controls	
C. Cooling towers	
D. Liquid cooling	
E. Air cooled	
F. Vortexing	
VII. Why Compressors Fail	13
A. Slugging	
B. Flooding	
C. Flooded starts	
D. Loss of lubrication	
E. Contaminations	
F. Overheating	
VIII. Clean Up After Burn Out	13
A. What is a burn out?	
B. What are the different types of burn out?	
C. What contaminates are created?	
D. What causes them?	
E. What is the proper procedure for cleaning a system?	
IX. Be Compressor Wise	13
A. Leaks	
B. Noise	
C. Low capacity	
D. Seized or tight	
X. Valves	13
A. Angle valves	
B. Gate valves	
C. Globe valves	
D. Flexible wedge disk gate valves	
E. Sliding stem gate valve	
F. Piping solenoid valves	
G. Piping king valves	
H. Valve pressure drops	
I. Safety	

PROGRAM TITLE: Commercial Heating and Air Conditioning Technology

COURSE TITLE: Air Conditioning and Refrigeration Theory II

CIP NUMBER: 0647.020100

LIST PERFORMANCE STANDARD ADDRESSED:

NUMBER(S): TITLES(S):

01.0 KNOW THE HISTORY/CONCEPTS OF REFRIGERATION AND AIR CONDITIONING -- The student will be able to:

01.03 Define the difference between air conditioning and refrigeration.
01.05 Describe the benefits of conditioned air.
01.06 Describe some of today's current issues regarding air conditioning--industry concerns and future ramification.

04.0 DEMONSTRATE SAFE WORKING PRACTICES AND PROCEDURES -- The student will be able to:

04.02 Describe the reasons for regular safety meetings.
04.03 Explain the reasons for company safety policies.
04.05 Explain the need for employee background checks and medical examinations.
04.06 Identify and use appropriate personal safety equipment.
04.07 Identify and use proper fire extinguishers and other such safety devices.
04.08 Identify and use emergency first air procedures.
04.09 Identify and use safe handling practices as they relate to hazardous and volatile fluids.
04.14 Identify and use proper tools/materials for the job.
04.20 Identify and use OSHA safety practices when working near moving equipment.
04.26 Define and use safety procedures when working with gases and combustibles.

05.0 DEMONSTRATE APPROPRIATE USE OF TOOLS AND ACCESSORIES -- The student will be able to:

05.01 Identify and use basic tools and accessories.
05.02 Identify and use power tools.
05.03 Identify and use fasteners.
05.05 Describe and apply appropriate maintenance processes for tools and accessories.
05.06 Identify and use specialized tools of the trade.

12.0 DEMONSTRATE A WORKING KNOWLEDGE OF MECHANICAL/ELECTRONIC FILTRATION AND AIR HANDLING FANS -- The student will be able to:

12.01 Identify and explain location and use of disposable mechanical filters.
12.02 Identify and explain location and use of permanent form, mesh and fiber mechanical filters.
12.03 Identify and know location and use of high efficiency mechanical filters.
12.04 Describe and troubleshoot the operation of electronic air cleaners.

LIST PERFORMANCE STANDARD ADDRESSED: (Continued)

NUMBER(S): TITLES(S):

12.05 Identify and maintain centrifugal and axial fans.
12.06 Remove and replace centrifugal and axial fans.
12.07 Determine the proper direction of rotation on centrifugal and axial fans.
12.08 Adjust v-belt tension.
12.09 Determine wear and alignment of pulleys.

13.0 DEMONSTRATE A WORKING KNOWLEDGE OF CODES AND STANDARDS -- The student will be able to:

13.01 Describe the reason for codes.
13.02 Discuss local codes.
13.03 Discuss standard codes.
13.04 Discuss uniform codes.
13.05 Identify codes and standards for the applicable area, locality of state.
13.06 Explain the relationship between codes and manufacturers' installation instructions.
13.07 Identify the purposes of the Air Cond. & Refrig. Inst., American Soc. of Heating, Refrig, & Air Cond. Engnrs. and Sheet Metal Air Cond. Contractors Natl. Assoc.

14.0 DEMONSTRATE A WORKING KNOWLEDGE IN HEATING START-UP, CHECKOUT AND OPERATION -- The student will be able to:

14.06 Apply good customer relations in classroom simulation.
14.13 Use tools and test equipment properly.

15.0 DEMONSTRATE A WORKING KNOWLEDGE IN AIR CONDITIONING START-UP AND SERVICE PROBLEM ANALYSIS -- The student will be able to:

15.03 Identify and use proper safety procedures when using tools and test equipment.
15.04 Explain local codes and ordinances.
15.10 Apply good customer relations in classroom simulation.

16.0 DEMONSTRATE EMPLOYABILITY SKILLS -- The student will be able to:

16.10 Demonstrate a knowledge of the "Florida Right-To-Know Law" as recorded in Florida Statutes Chapter 442.

17.0 DEMONSTRATE AN UNDERSTANDING OF ENTREPRENEURSHIP -- The student will be able to:

17.07 Demonstrate knowledge of state licensing requirements.

Florida State College At Jacksonville

Course Learning Outcomes & Assessment

NOTE: Use either the Tab key or mouse click to move from field to field. The box will expand to accommodate your entry.

Section 1	
COURSE PREFIX AND NUMBER: ACR-0002	**SEMESTER CREDIT HOURS (CC):** CONTACT HOURS (NCC): 125
COURSE TITLE: Air Conditioning and Refrigeration Theory II	

Section 2

TYPE OF COURSE: (Click on the box to check all that apply)

☐	AA Elective	☐	AS Required Professional Course	☐	College Prep
☐	AS Professional Elective	☐	AAS Required Professional Course	X	Technical Certificate
☐	Other _____	X	PSAV	☐	Apprenticeship
☐	General Education: (For General Education courses, you must also complete Section 3 and Section 7)				

Section 3 (If applicable)

INDICATE BELOW THE DISCIPLINE AREA FOR GENERAL EDUCATION COURSES:

☐	Communications	☐	Social & Behavioral Sciences	☐	Mathematics
☐	Natural Sciences	☐	Humanities		

Section 4

INTELLECTUAL COMPETENCIES:

X	Reading	☐	Speaking	X	Critical Analysis	X	Quantitative Skills	☐	Scientific Method of Inquiry
X	Writing	☐	Listening	☐	Information Literacy	☐	Ethical Judgment	☐	Working Collaboratively

Section 5 **LEARNING OUTCOMES**		**METHOD OF ASSESSMENT**
•	Demonstrate the ability to understand, and record A/C unit's operation parameters and air flow on maintenance forms and records to determine if the unit is operating correctly	Draw an Air Conditioning Duct System Label all components. Written explanation of the proper operation of Air Conditioning Systems and Duct System. Assessment by instructor 75% of possible 100 points to achieve a passing score.
•	Evaluate a system and or component repair weather actual or hypothetical and or determine repair needed.	Multiple choice, fill in blank & essay question test. Assessment by instructor, 75% of possible 100 points to achieve a passing score.
•	Be able to understand and know how to apply basic safety skills	Multiple choice, fill in blank & essay question test. Assessment by instructor, 75% of possible 100 points to achieve a passing score.
•	Understand basic air conditioning, refrigeration cycle, and air movement as it pertains to air conditioning.	Multiple choice, fill in blank & essay question test. Assessment by instructor, 75% of possible 100 points to achieve a passing score.
•	Understand how to correctly size air conditioning systems buy using Heat Loss and Heat gain methods and proper duct design.	Multiple choice, fill in blank & essay question test. Assessment by instructor, 75% of possible 100 points to achieve a passing score.
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Section 6

Name of Person Completing This Form: Gary Krupa Date: 11/2009