

Residential Air Conditioning Systems Design (HART 2445)



Credit: 4 semester credit hours (2 hours lecture, 6 hours lab)

Prerequisite/Co-requisite: HART 1441

Course Description

Study of the properties of air and results of cooling, heating, humidifying or dehumidifying; heat gain and heat loss calculations including equipment selection and balancing the air system.

Required Textbook and Materials

1. Electricity for Refrigeration, Heating and Air Conditioning by Russell E. Smith, 8th edition.
 - a. ISBN number is 10: 1-111-03874-0
2. Modern Refrigeration and Air Conditioning by Althouse, Turnquist, and Bracciano, 20th Edition
 - a. ISBN number is 978-1-63126-354-5

Course Objectives

Upon completion of this course, the student will be able to:

1. Calculate heat loss and heat gain.
2. Design a complete duct system.
3. Size heating and cooling equipment to the structure.
4. Perform a load calculation using Manual J or other load calculation forms.
5. Balance air flow on a duct system.

Course Outline

- A. Introduction
 1. Introduction of faculty and students
 2. Review Syllabus
 3. Review Class Policies
 4. Review Lab Assignments
- B. Review of Basic Heat Transfer
 1. Convection
 2. Conduction
 3. Radiation
- C. Blue Print
 1. Symbols
 2. Measurements

- 3. Plans
- D. Basic Geometry
 - 1. Calculating Area of various shapes
 - 2. Calculating Volume of various shapes
- E. Heat Load Calculations
 - 1. Calculating R & U values of building materials
 - 2. Calculating with Manual J formulas & work sheet
 - 3. Calculating with various Heat Load Software Programs
- F. Duct Design & Fabrication
 - 1. Delivering CFM
 - 2. Managing FPM
 - 3. Managing Static Pressure
 - 4. Efficient Layout
 - 5. Building Duct Work
 - 6. Sealing Duct Work
 - 7. Installing Duct Work
 - 8. NAIMA Certification

Grade Scale

A = 90 - 100

B = 80 - 89

C = 70 - 79

D = 60 - 69

F = 0 - 59

Course Evaluation

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|------------------------|-----|
| 1. 4 Objective Test | 25% |
| 2. Lab Projects/test | 25% |
| 3. Comprehensive Final | 25% |
| 4. Homework | 25% |

Course Requirements

- 1. Homework assignments
- 2. Hands on lab activities
- 3. Complete comprehensive final
- 4. AAS students should take HVAC Excellence Test.

Course Policies

1. There will be *no* horseplay tolerated.
2. No open foot shoes, sandals, or flip-flops: closed foot shoes *only*.
3. No smoking, eating, or sleeping will be tolerated during class.
4. If an assignment is late, there will be 5 points deducted per day.
5. No hanging jewelry or rings in lab.

Disabilities Statement

The Americans with Disabilities Act of 1992 and Section 504 of the Rehabilitation Act of 1973 are federal anti-discrimination statutes that provide comprehensive civil rights for persons with disabilities. Among other things, these statutes require that all students with documented disabilities be guaranteed a learning environment that provides for reasonable accommodations for their disabilities. If you believe you have a disability requiring an accommodation, please contact the Special Populations Coordinator at (409) 880-1737 or visit the online resource:

<http://www.lit.edu/depts/stuserv/special/defaults.aspx>

Student Code of Conduct Statement

It is the responsibility of all registered Lamar Institute of Technology students to access, read, understand and abide by all published policies, regulations, and procedures listed in the *LIT Catalog and Student Handbook*. The *LIT Catalog and Student Handbook* may be accessed at www.lit.edu or obtained in print upon request at the Student Services Office.

Course Schedule

Week	Topic	Reference
1	Introduction & Safety Orientation	Lecturer Notes & Hand-Outs
2	Review of Basic Heat Transfer Theory	Chapter 1 & Lecturer Notes
3	Reading Basic Blue Print Layouts	Lecturer Notes & Hand-Outs
4	Review of Basic Geometry	Lecturer Notes
5	Identifying R-Values of Various Building Materials & Insulations	Lecturer Notes & Chapter 27
6	Converting R-Values into U-Values & calculating BTU Heat Gain/Loss	Lecturer Notes & Lab Procedure

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Course Syllabus

7	Calculating BTU Heat Gain/Loss	Lecturer Notes & Lab Procedure
8	Calculating Manual J Heat Gain/Loss by Hand	Lecturer Notes, Chapter 27 & Lab Procedure
9	Calculating Manual J Heat Gain/Loss by Load Calculation Software	Computer Lab
10	Identifying Air Qualities & Characteristics & Measuring FPM/CFM	Lecturer Notes, Chapter 23 & Lab Procedure
11	Sizing an Air Distribution System	Lecturer Notes, Chapter 23 & Lab Procedure
12	Designing an Air Distribution System	Lecturer Notes, hand-outs & Lab Procedure
13	Fiberglass Duct Board Safety Orientation	Visual Aid & Lecturer Notes
14	Fabricating an Air Distribution System	NAIMA Book
15	Review for Final Exam	Lecturer Notes
16	Final Exam	NAIMA Certification

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Course Syllabus