FORM VERSION: 5/95
DATE REVISED: 8/99

PALOMAR COLLEGE
COURSE OUTLINE OF RECORD FOR
DEGREE CREDIT COURSE

__X__ Transfer course __X__ A.A. degree applicable course

(check all that apply)

COURSE NUMBER AND TITLE: AP SM 110 Advanced Design III

UNIT VALUE: 4

MINIMUM NUMBER OF SEMESTER HOURS: 96

BASIC SKILLS REQUIREMENTS:

Appropriate language and computational skills.

ENTRANCE REQUIREMENTS

PREREQUISITE: Apprenticeship Sheet Metal 109

COREQUISITE: None.

RECOMMENDED PREPARATION: None.

SCOPE OF COURSE:

A continuation of advanced design and layout using simplified triangulation and instruction in powder actuated tools.

SPECIFIC COURSE OBJECTIVES:

The student will be able to:

1. Understand and apply local, state and federal safety rules and regulations to specific job sites.

2. Recite the advantages of pursuing a career as a skilled craftsman in the sheet metal trade.

3. Explain trade terms, use of tools and materials and the fundamental processes of sheet metal work.

4. Apply the basic principles of layout, construction, fabrication and maintenance as related to the sheet metal industry.

CONTENT IN TERMS OF SPECIFIC BODY OF KNOWLEDGE:

I. The Years Ahead
   A. responsibilities
   B. Opportunities

II. Customer Service
   A. Dealing with People
   B. Communication
   C. Providing Good Service
   D. Handling Conflicts

III. Supervision
   A. Levels of Supervision
   B. Supervisors' Responsibilities
   C. Record Keeping
   D. Health and Safety
   E. Advantages/Disadvantages of Being a Supervisor

IV. Organizing Work and Solving Problems
   A. Organizing a Project
      1. Critical Path Method
      2. Avoiding Problems
      3. Solving Problems
      4. Dealing with Errors
   B. Personnel Problems
   C. Problem-Solving Techniques
   D. Controlling Drug and Alcohol Abuse
   E. Responsibilities
      1. Co-workers'
      2. Supervisors'
      3. Yourself
   F. Getting Help

V. Computer Estimating
   A. Estimating Programs
      1. How Estimating Programs are Used
      2. Digitizer Pad, Electronic Pen
   B. Other Computer Programs
      1. CAD Program
      2. Scheduling Program
      3. Project Management Program

VI. Electricity
   A. Understanding Electricity
   B. Magnetism
   C. Safety Precautions
   D. Ladder Diagrams
   E. Sequence of Operation for Air Conditioning System with Electric Heat

VII. Automatic Controls
- A. Basic Control System
- B. Basic Operating Principles
- C. Pneumatic Controls
- D. Direct Digital Controls (DDC)

VIII. Duct Leakage Testing
- A. Controlling Leaks
- B. Allowable Leakage Rates

IX. Using Instruments
- A. Introduction and General Care of Measuring Instruments
- B. Analog and Digital Readings
- C. Anemometer
- D. Flow Hood
- E. Tachometer
- F. Manometer
- G. Thermometers
- H. Psychrometer
- I. Electrical Measurement

X. Testing, Adjusting and Balancing (TAB)
- A. Introduction and reasons for performing TAB
- B. The TAB Technician
- C. Preparing the HVAC System for TAB
- D. Planning and Preparation
  1. Tab Notebook
  2. Drawings and Specifications
  3. Drawing of the System
- E. Human Relations

XI. Balancing Environmental Air Systems
- A. System Balancing
- B. Proportional Air Balancing
- C. Sequential Method of Air Balancing

XII. Balancing Environmental Hydronic Systems
- A. Meters, Pumps, Piping
- B. Flow Meter Balancing Method
- C. Thermal Method of Balancing

XIII. Commissioning
- A. Scope of Commissioning
  1. Commissioning Process
  2. Systems Covered
- B. Commissioning Agent
- C. Commissioning Technician
- D. Levels of Commissioning
  1. Level 1 - Basic Commissioning
  2. Level 2 - Comprehensive Commissioning
  3. Level 3 - Critical Systems Commissioning

XIV. Energy Management
- A. The Need for Energy Management
  - 1. Economic Reasons
  - 2. Environmental Reasons
- B. Energy Use Analysis
- C. Making the Energy Audit
  - 1. Planning
  - 2. Walk-Through
  - 3. TADS (Technical Audit and Design Survey) Report
- D. Building Energy Systems
  - 1. HVAC System
  - 2. Control System
  - 3. Lighting System
  - 4. Electrical System
  - 5. Building Envelope
  - 6. Occupancy and Use
  - 7. Plumbing
  - 8. Special Systems
- E. Working with People

REQUIRED READING:

Schumacker, Fred and Claude Zinngrabe. Sheet Metal Workers Pocket Manual 1. Alexandria, Virginia: National Training Fund for the Sheet Metal and Air Conditioning Industry, 1988.

Sheet Metal Apprentice Textbook 4. 3rd Edition. Alexandria, Virginia: National Training Fund for the Sheet Metal and Air Conditioning Industry, 1997.

Sheet Metal Apprentice Workbook 4. 3rd Edition. Alexandria, Virginia: National Training Fund for the Sheet Metal and Air Conditioning Industry, 1997.

SUGGESTED READING:

Budzik, Richard. Fittings Used Today That Require Triangulation. Chicago: Practical Publications, 1986.

Budzik, Richard. Specialty Items Used Today. Chicago: Practical Publications, 1986.

Dougherty, Powell, Foster. Sheet Metal Pattern Drafting and Shop Problems. 4th Edition. Peoria, Illinois: Chas. A. Bennett Co., 1985.

Kaberlein, Paul. Shortcuts For Round Layouts. Manchester: Glencoe/McGraw-Hill Publishers, 1982.

Meyer, Leo. Sheet Metal Shop Practice. 4th Edition. Homewood, Virginia: American Technical Publishers, 1989.

Shaeffer, Ralph. Calculator Layout-The Numerical Concept, Volumes I & II. Portland: Ralmar Press Publications, 1983.

Sheet Metal Workers Journal.

Snips Magazine.

REQUIRED WRITING:

The student shall complete a set of plans suitable for the manufacture of a project. A list of materials and all mathematical specifications shall accompany the plans. Student will complete various projects using mathematical skills and problem solving exercises as assigned. Minimum two pages for each set of plans.

OUTSIDE ASSIGNMENTS:

Students are expected to spend a minimum of three hours per unit per week in class and on outside assignments, prorated for short term classes.

Readings from the text, related materials, and completing workbook assignments.

INSTRUCTIONAL METHODOLOGY:

Check all that apply:
__X__ lecture
__X__ laboratory
_____ lecture-laboratory combination
_____ directed study

This course may be offered as a distance education course and meets Title 5 regulations 55370, 55372, 55374, 55376, 55378, and 55380. Yes _____ No __X__

If yes, check all that apply. (See guidelines for preparation for definitions.)
_____ telecourse
_____ mediated instruction
_____ computer assisted instruction

GRADING POLICY AND STANDARDS (include methods of determining whether the stated objectives have been met by students):

16%	Workbook Assignments	A = 100 - 90
42%	Lab Project	B = 89 - 80
42%	Exams	C = 79 - 70
		F = below 70

IS COURSE REPEATABLE FOR REASON(S) OTHER THAN DEFICIENT GRADE?
Yes __X__ No _____ Number of times course may be taken for credit: __2__

If yes, identify specific provision of Title 5 Division 2 section(s) 55761-55763 and 58161 which qualifies course as repeatable: 58161-1C

CONTACT PERSON: Director, Vocational Programs, Ext. 2286