

# APPLIED INDUSTRIAL TECHNOLOGY (SHEET METAL WORKING) (ATSM)

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## ATSM-1010 Benefits Management

### 1 Credit

The collective bargaining process, worker wages and benefits including hospitalization and pension plans including annuities. Also covered are membership investments, dues structure and personal money management.

*Lecture: 1 hours*

*Prerequisite(s): Departmental approval: admission to Sheet Metal Worker's apprenticeship program.*

## ATSM-1020 Trade History

### 1 Credit

An introductory course covering the sheet metal industry and its history. Included is a discussion of the roles and responsibilities of the sheet metal worker.

*Lecture: 1 hours*

*Prerequisite(s): Departmental approval: admission to Sheet Metal Worker's apprenticeship program.*

## ATSM-1030 Layout and Fabrication I

### 2 Credits

Introduces various techniques that are required to layout and fabricate fittings from sheet metal. In addition, the transferring of measurements from mechanical and shop drawings, to fabrication of metal, and safety in using tools and machinery for cutting metal will be discussed.

*Lecture: 2 hours*

*Prerequisite(s): Departmental approval: admission to Sheet Metal Worker's apprenticeship program.*

## ATSM-1040 OSHA 16 Hour Safety Training

### 1 Credit

Introduction to the Occupational Safety and Health Act (OSHA). Topics include employee responsibilities and rights, standards, and basic hazard training.

*Lecture: 1 hours*

*Prerequisite(s): Departmental approval: admission to Sheet Metal Worker's apprenticeship program.*

## ATSM-1050 Fire Life Safety Tech I

### 1 Credit

Course covers the purpose of life safety as it pertains to dampers in HVAC systems and fire protection. Included are discussions related to codes, standards and installation procedures as prescribed by the manufacturer and the Underwriters Laboratory (UL). Also covers mounting brackets, operating components and access doors. Testing procedures and schedules and maintenance procedures are addressed.

*Lecture: 1 hours*

*Prerequisite(s): Departmental approval: admission to Sheet Metal Worker's Apprenticeship program.*

## ATSM-1060 Sheet Metal OSHA 30

### 2 Credits

Certification course covering the Occupational Safety and Health Administration (OSHA) regulations for sheet metal worker safety on construction job sites. Covers hazard recognition, Heating, Ventilation and Air Conditioning HVAC equipment placement and safe installation using lifting and hoisting devices. Also includes training requirements for the sheet metal worker and employer and code compliance.

*Lecture: 2 hours*

*Prerequisite(s): Departmental approval: admission to Sheet Metal Worker's apprenticeship program.*

## ATSM-1070 Sheet Metal Electricity

### 3 Credits

Covers basic electricity and magnetism required for servicing HVAC equipment in residential and light commercial buildings. Automatic controls used to maintain temperature and humidity is included. Various motor types and motor phases along with service and shop exercises and application are integrated.

*Lecture: 3 hours*

*Prerequisite(s): Departmental approval: admission to Sheet Metal Worker's apprenticeship program.*

## ATSM-1080 New EPA 608

### 1 Credit

Certification course covering the new EPA standards with respect to the Clean Air Act enabling the participant to receive current certifications in the refrigerant usage, transportation and disposal procedures. In addition testing requirements, including the Montreal Protocol, vapor/compression cycles and gage manifold are covered.

*Lecture: 1 hours*

*Prerequisite(s): Departmental approval: admission to Sheetmetal Worker's apprenticeship program.*

## ATSM-1090 HVAC Cleaning

### 1 Credit

Covers the cleaning of various Heating Ventilation and Air Conditioning (HVAC ) systems including methods, health and safety issues and restoration and remediation evaluations. Included are demonstrations and applications of cleaning procedures using required tools and equipment.

*Lecture: 1 hours*

*Prerequisite(s): Departmental approval: admission to Sheet Metal Workers apprenticeship program.*

## ATSM-1210 Estimating and Bidding

### 1 Credit

Covers the estimating and bidding process used by contractors to justify costs and to be awarded contracts for sheet metal projects. Included is bid information, contract language and field costs.

*Lecture: 1 hours*

*Prerequisite(s): Departmental approval: admission to Sheet Metal Worker's apprenticeship program.*

### **ATSM-1220 Layout and Fabrication II**

#### **2 Credits**

Covers sheet metal layout and design applications in conjunction with parallel line and radial line development. Included are shop exercises involving applied math and geometric concepts that are required for calculating cut sizes for ductwork. Soldering techniques for assembling sheet metal patterns will also be covered.

*Lecture: 2 hours*

*Prerequisite(s): Departmental approval: admission to Sheet Metal Worker's apprenticeship program.*

### **ATSM-1230 Field Installation**

#### **3 Credits**

Covers the techniques required to layout, cut and fabricate components necessary to construct plenum boxes in heating and cooling systems installations. Included are applied math concepts for layout and cutting operations and drafting exercises.

*Lecture: 3 hours*

*Prerequisite(s): Departmental approval: admission to Sheet Metal Worker's apprenticeship program.*

### **ATSM-1250 Architectural Sheet Metal ASM**

#### **6 Credits**

Covers the function and forms of architectural sheet metal including consequences resulting from expansion and contraction on various metals, methods of maintaining moisture control and procedures employed to counter environmental effects on structures. Also includes fabrication and application techniques used to install architectural sheet metal using flashings, laps, seams and different sealants.

*Lecture: 6 hours*

*Prerequisite(s): Departmental approval: admission to Sheet Metal Worker's apprenticeship program.*

### **ATSM-1290 Sheet Metal D9 1**

#### **1 Credit**

Certification course covering the procedures required by the American Welding Society and in conjunction with testing parameters as prescribed by the Welding Procedures Specifications for completing the sheet metal workers welding test. Course includes a complete review of metal inert gas (MIG) welding and a comprehensive study of the certification process.

*Lecture: 1 hours*

*Prerequisite(s): Departmental approval: admission to Sheet Metal Worker's apprenticeship program.*

### **ATSM-1802 Special Topics: New EPA #608**

#### **1 Credit**

Certification course covering the new EPA standards with respect to the Clean Air Act enabling the participant to receive current certifications in the refrigerant usage, transportation and disposal procedures. In addition testing requirements, including the Montreal Protocol, vapor/compression cycles and gage manifold is covered.

*Lecture: 1 hours*

*Prerequisite(s): Departmental approval: admission to Sheetmetal Worker's apprenticeship program.*

### **ATSM-2110 Plans and Specifications**

#### **2 Credits**

Introduces the student to construction and shop drawings. Interpretation of the drawings and how they are generated will be discussed. In addition, specifications and how they are used in conjunction with drawings will be covered.

*Lecture: 2 hours*

*Prerequisite(s): Departmental approval: admission to Sheet Metal Worker's apprenticeship program.*

### **ATSM-2120 Sheet Metal Weld I**

#### **3 Credits**

Course covers the application of welding in the sheet metal industry including cutting and burning and a discussion of the various welding groups and positions, electrode classifications, and maintenance and repair of welding machines. Included is a demonstration and student application of the various welding techniques, fit-ups, and welding processes.

*Lecture: 3 hours*

*Prerequisite(s): Departmental approval: admission to Sheet Metal Worker's apprenticeship program.*

### **ATSM-2130 Sheet Metal Welding II**

#### **3 Credits**

Covers gas metal arc welding (GMAW) and gas tungsten arc welding (GTAW) processes used in the sheet metal industry. Equipment set up, electrode selection for various sheet metal operations and safety precautions is presented as part of the completion requirements. In addition, the student will demonstrate the ability to apply weld related metals and gauges including grooves and fillet beads in accordance with the American Welding Society.

*Lecture: 3 hours*

*Prerequisite(s): Departmental approval: admission to Sheet Metal Worker's apprenticeship program or a member in good standing with the sheet metal workers union.*

### **ATSM-2140 Industrial I Welding**

#### **3 Credits**

Course covers the work scope of industrial sheet metal, applied math concepts used for layout applications and fabrication and welding techniques. In addition, rigging and hoisting operations and worker safety considerations will be addressed.

*Lecture: 3 hours*

*Prerequisite(s): Departmental approval: Must be enrolled in the union sheet metal apprenticeship program and/or be a member in good standing of the sheet metal workers union*

### **ATSM-2150 Sheet Metal: Industrial II Welding**

#### **3 Credits**

Advanced sheet metal course covering the assembly and fabrication of industrial service platforms. Extensive layout procedures required for the circular cage and accompanying stairway and handrail is covered. In addition, proficiency in welding processes in a shop setting is incorporated into the course.

*Lecture: 3 hours*

*Prerequisite(s): Departmental approval and a member in good standing of the sheet metal union*

**ATSM-2160 Industrial III Food Service****3 Credits**

Advanced sheet metal and welding course covering all aspects of stainless steel applications in the commercial food industry. Included are specialized fabrication procedures and assembly techniques required for food grade sanitary environments. Specific welding processes required seam finishes are presented and practiced to meet strict industry standards. Also, regulations related to grease duct fabrication, including elimination of pocket forming grease traps are explained and emphasized.

*Lecture: 3 hours*

*Prerequisite(s): Departmental approval and a member in good standing of the Sheet Metal Workers Union*

**ATSM-2170 Architectural Sheet Metal II****3 Credits**

Advanced course covering different types of sheet metal roofs, fabrication and installation techniques, and safety concerns related to fall arrest systems and specific personal protective equipment. In addition, composite panels, drainage systems and related conductor heads and commercial skylights with emphasis on purpose and application will be presented and practiced.

*Lecture: 3 hours*

*Prerequisite(s): Departmental approval: admission to Sheetmetal Worker's apprenticeship program.*

**ATSM-2180 Metallic Composite Material MCM****3 Credits**

Advanced course covering the applications of metallic composite materials (MCM) used as decorative and functional external and interior covering on commercial and residential structures. Included are proper handling and layout techniques, waterproofing of various substrates and installation procedures.

*Lecture: 3 hours*

*Prerequisite(s): Departmental approval and a member of the Sheet Metal Workers' union.*

**ATSM-2310 Refrigeration I****1 Credit**

Introduces refrigeration theory, heat transfer, and the refrigeration cycle, including the piping of residential split systems using refrigeration tubing, with concentration on installation techniques including brazing and soldering. Also included are various layout procedures using mechanical and shop drawings.

*Lecture: 1 hours*

*Prerequisite(s): Departmental approval: admission to Sheet Metal Worker's apprenticeship program.*

**ATSM-2330 Layout and Fabrication III****3 Credits**

Covers sheet metal layout, fabrication, and design applications in conjunction with the triangulation method of development. Included are shop exercises involving applied math, trigonometry, and geometric concepts that are required for calculating cut sizes for ductwork. Soldering techniques for assembling sheet metal patterns will also be covered.

*Lecture: 3 hours*

*Prerequisite(s): Departmental approval: admission to Sheet Metal Worker's apprenticeship program.*

**ATSM-2340 Advanced Field Installation****3 Credits**

Develop team building skills by engaging in a group exercise that requires interaction among the participants to design, construct, and install the required ductwork for a project in accordance with the parameters of tolerance within a designated work area. Develop a set of construction and mechanical drawings that are needed for this specific learning exercise.

*Lecture: 3 hours*

*Prerequisite(s): Departmental approval: admission to Sheet Metal Worker's apprenticeship program.*

**ATSM-2350 Duct Design and Testing****2 Credits**

Covers duct configuration and design concepts including plenum requirements and aspect ratios covering air loss due to friction. Also included is a section on performing a system leak test.

*Lecture: 2 hours*

*Prerequisite(s): Departmental approval: admission to Sheet Metal Worker's apprenticeship program.*

**ATSM-2360 Load Calculations****1 Credit**

Covers heating and air conditioning load calculations required for selecting the proper size equipment for various types of buildings. Included are sections dealing with heat transmission, design temperatures, and air infiltration.

*Lecture: 1 hours*

*Prerequisite(s): Departmental approval: admission to Sheet Metal Worker's Apprenticeship program.*

**ATSM-2410 Residential Heating****3 Credits**

Identifies the different types of heating systems, discusses the combustion process including fuel-air mixtures and atomization of fuel oil. Also covers electrical circuitry, air circulation, controls and safety limits.

*Lecture: 3 hours*

*Prerequisite(s): Departmental approval: admission to Sheet Metal Worker's apprenticeship program.*

**ATSM-2420 Refrigeration II****2 Credits**

Covers the components of refrigeration systems, applications to air conditioning and the use of specialty tools including vacuum pumps and gages. Installation methods, maintenance and troubleshooting are also covered.

*Lecture: 2 hours*

*Prerequisite(s): Departmental approval: admission to Sheet Metal Worker's apprenticeship program.*

**ATSM-2510 Commercial Roof Top Units****2 Credits**

Describes the different types of heating/air conditioning systems used on commercial buildings, including the use of specialty roof mounting systems. Also covered are electrical circuitry, air circulation, gas piping and optional accessories.

*Lecture: 2 hours*

*Prerequisite(s): Departmental approval: admission to Sheet Metal Worker's apprenticeship program.*

**ATSM-2520 Project Management**

**2 Credits**

Covers the leadership and motivational aspects of project management including contract administration, project organization and site supervision.

*Lecture: 2 hours*

*Prerequisite(s): Departmental approval: admission to Sheet Metal Worker's Apprenticeship Program.*

**ATSM-2530 Direct Digital Controls**

**2 Credits**

Covers the different types of electronic and pneumatic control circuits that are used in the heating and air conditioning industry. Included are sections covering control components, loops and applications and installation procedures. Advantages and disadvantages of using digital controls are also covered.

*Lecture: 2 hours*

*Prerequisite(s): Departmental approval: admission to Sheet Metal Worker's apprenticeship program.*

**ATSM-2540 SMART ICRA**

**1 Credit**

Designed to promote the awareness of infection control in existing health-care facilities. Infection control techniques used to prevent the spread of infectious agents to other patients, other areas of the facility and to the workers themselves, will be emphasized. Also covers the types of hazards presented to workers in health-care facilities.

*Lecture: 1 hours*

*Prerequisite(s): Departmental approval: admission to Sheet Metal Worker's apprenticeship program.*

**ATSM-2550 Fire Life Safety Tech I Supervisor**

**1 Credit**

Certification course covering the management systems of Fire Life Safety (FLS) including the principles of fire and smoke resistance and fire stages. Included is a comprehensive study of the features and components of FLS dampers and testing requirements.

*Lecture: 1 hours*

*Prerequisite(s): Departmental approval: admission to Sheet Metal Worker's apprenticeship program and/or a member in good standing with the sheet metal worker's union.*

**ATSM-2780 NATE Certification**

**2 Credits**

Advanced course for the North American Technical Excellence (NATE) certification covering the core concepts of the heating, ventilation and air conditioning (HVAC) industry including safety, basic construction and electricity. Also includes a comprehensive review of heat pumps, furnaces, and air distribution.

*Lecture: 2 hours*

*Prerequisite(s): Departmental approval: Admission to Sheet Metal Worker's Apprenticeship program.*

**ATSM-2790 Sheet Metal Foreman Training**

**1 Credit**

Covers the qualifications and characteristics required for sheet metal foremanship in the construction industry. Required attributes, the management processes, job planning, workforce scheduling, material tracking, and coordination skills discussed. Also includes worker motivation and evaluation techniques and other skills needed to be an effective sheet metal foreman.

*Lecture: 1 hours*

*Prerequisite(s): Departmental approval: admission to Sheet Metal Worker's apprenticeship program.*

**ATSM-2801 Special Topics: Fire Life Safety Tech I Supervisor**

**1 Credit**

Certification course covering the management systems of Fire Life Safety including the principals of fire and smoke resistance and fire stages.

Included is a comprehensive study of the features and components of FLS dampers and testing requirements.

*Lecture: 1 hours*

*Prerequisite(s): Departmental approval: admission to Sheet Metal Worker's apprenticeship program.*

**ATSM-2802 Special Topics: SMART ICRA**

**1 Credit**

This course is designed to promote the awareness of infection control in existing health-care facilities. Infection control techniques used to prevent the spread of infectious agents to other patients, other areas of the facility and to the workers themselves, will be emphasized. An awareness of the types of hazards presented to workers in health-care facilities will be covered as part of this course.

*Lecture: 1 hours*

*Prerequisite(s): Departmental approval: Admission to Sheet Metal Worker's apprenticeship program.*

**ATSM-2803 Special Topics: FLS Tech II Supervisor**

**1 Credit**

Advanced course covering different Fire Life Safety FLS systems related to property protection, occupancy uses and supervisory qualifications required for smoke management and control. Included will be a review of general FLS considerations.

*Lecture: 1 hours*

*Prerequisite(s): Departmental approval: admission to Sheetmetal Worker's apprenticeship program.*

**ATSM-2804 Special Topics: Sheet Metal Foreman Training**

**1 Credit**

Course covers the qualifications and characteristics required for sheet metal foremanship in the construction industry. Identifying and explaining the required attributes and the management processes and job planning, workforce scheduling and material tracking and coordination skills is included. The course also reviews worker motivation and evaluation techniques and other skills needed to be an effective sheet metal foreman.

*Lecture: 1 hours*

*Prerequisite(s): Departmental approval: admission to Sheet Metal Worker's Apprenticeship program.*

**ATSM-2805 Special Topics: Sheet Metal D.9.1****1 Credit**

Certification course covering the procedures required by the American Welding Society and in conjunction with testing parameters as prescribed by the Welding Procedures Specifications for completing the sheet metal workers welding test. Course includes a complete review of metal inert gas (MIG) welding and a comprehensive study of the certification process.

*Lecture: 1 hours*

*Prerequisite(s): Departmental approval: admission to Sheet Metal Worker's apprenticeship program.*

**ATSM-2806 Special Topics: OSHA for Sheet Metal Workers****2 Credits**

Certification course covering the Occupational Safety and Health Administration (OSHA) regulations for sheet metal worker safety on construction jobsites. Course covers hazard recognition, Heating, Ventilation and Air Conditioning HVAC equipment placement and safe installation using lifting and hoisting devices. In addition, training requirements for the sheet metal worker and employer and code compliance is a part of this course.

*Lecture: 2 hours*

*Prerequisite(s): Departmental approval: admission to Sheet Metal Worker's apprenticeship program.*

**ATSM-2807 Special Topics: Commercial Roof Top Units****2 Credits**

This course describes the different types of heating/air conditioning systems used on commercial buildings, including the use of specialty roof mounting systems. Also covered are electrical circuitry, air circulation, gas piping and optional accessories.

*Lecture: 2 hours*

*Prerequisite(s): Departmental approval: admission to Sheet Metal Worker's apprenticeship program.*

**ATSM-2809 Special Topics: Plans and Specifications****2 Credits**

This course introduces the student to construction and shop drawings. Interpretation of the drawings and how they are generated will be discussed. In addition, specifications and how they are used in conjunction with drawings will be covered.

*Lecture: 2 hours*

*Prerequisite(s): Departmental approval: admission to Sheet Metal Worker's apprenticeship program.*

**ATSM-2810 Special Topics: NATE Certification****2 Credits**

Advanced course for the North American Technical Excellence NATE certification covering the core concepts of the heating, ventilation and air conditioning HVAC industry including safety, basic construction and electricity. Also included is a comprehensive review of heat pumps, furnaces, and air distribution.

*Lecture: 2 hours*

*Prerequisite(s): Departmental approval and a member in good standing of the Sheet Metal Union.*

**ATSM-2812 Special Topics: Sheet Metal Weld I****3 Credits**

Course covers the application of welding in the sheet metal industry including cutting and burning and a discussion of the various welding groups and positions, electrode classifications, and maintenance and repair of welding machines. Included is a demonstration and student application of the various welding techniques, fit-ups, and welding processes.

*Lecture: 3 hours*

*Prerequisite(s): Departmental approval: admission to Sheet Metal Worker's apprenticeship program.*

**ATSM-2813 Special Topics: Architectural Sheet Metal II****3 Credits**

Advanced course covering different types of sheet metal roofs, fabrication and installation techniques, and safety concerns related to fall arrest systems and specific personal protective equipment. In addition, composite panels, drainage systems and related conductor heads and commercial skylights will be covered with emphasis on purpose and application will be presented and practiced.

*Lecture: 3 hours*

*Prerequisite(s): Departmental approval: admission to Sheetmetal Worker's apprenticeship program.*

**ATSM-2814 Special Topics in Metallic Composite Material MCM****3 Credits**

Advanced course covering the applications of metallic composite materials MCM used as decorative and functional external and interior covering on commercial and residential structures. Included are proper handling and layout techniques, waterproofing of various substrates and installation procedures.

*Lecture: 3 hours*

*Prerequisite(s): Departmental approval and a member of the sheet metal workers union*

**ATSM-2816 Special Topics: Sheet Metal: Electricity****3 Credits**

Course covering basic electricity and magnetism required for servicing HVAC equipment in residential and light commercial buildings. Automatic controls used to maintain temperature and humidity is included. Various motor types and motor phases along with service and shop exercises and application are integrated.

*Lecture: 3 hours*

*Prerequisite(s): Departmental approval and/or a union sheet metal apprentice or a union sheet metal journeyman.*

**ATSM-2817 Special Topics: Industrial I Welding Fabrication****3 Credits**

Course covers the work scope of industrial sheet metal, applied math concepts used for layout applications and fabrication and welding techniques. In addition, rigging and hoisting operations and worker safety considerations will be addressed.

*Lecture: 3 hours*

*Prerequisite(s): Departmental approval and a member of the sheet metal workers union.*

**ATSM-2818 Special Topics: Sheet Metal Lagging and Mechanical Insulating.**

**4 Credits**

A specialty course in the sheet metal industry covering the practices of insulating heating, ventilating and air conditioning units and supply lines and transmission pipes of different sizes. Types of insulation and lagging and special tools and equipment will be discussed and demonstrated and specific safety concerns for field installations is included. In addition, applications required on various vessels, including large tanks, boilers and chutes will be addressed. The student will apply demonstrated techniques on projects similar to those used on construction projects and in accordance with industry standards.

*Lecture: 4 hours*

*Prerequisite(s): Departmental Approval: Admission to Sheet Metal Worker's Apprenticeship Program.*

**ATSM-2820 Special Topics in Sheet Metal Industrial II Welding**

**3 Credits**

Advanced sheet metal course covering the assembly and fabrication of industrial service platforms. Extensive layout procedures required for the circular cage and accompanying stairway and handrail is covered. In addition, proficiency in welding processes in a shop setting is incorporated into the course.

*Lecture: 3 hours*

*Prerequisite(s): Departmental approval, and instructor approval, and ENG-0995 Applied College Literacies, or appropriate score on English Placement Test. Note: ENG-0990 Language Fundamentals II taken prior to Fall 2021 will also meet prerequisite requirements.*

**ATSM-2821 Special Topics in Industrial III Food Service**

**3 Credits**

Advanced sheet metal and welding course covering all aspects of stainless steel applications in the commercial food industry. Included are specialized fabrication procedures and assembly techniques required for food grade sanitary environments. Specific welding processes required seam finishes are presented and practiced to meet strict industry standards. Also, regulations related to grease duct fabrication, including elimination of pocket forming grease traps are explained and emphasized.

*Lecture: 3 hours*

*Prerequisite(s): Departmental approval and a member in good standing of the Sheet Metal Workers Union*

**ATSM-2822 Special Topics in Sheet Metal Welding II**

**3 Credits**

Course covers gas metal arc welding GMAW and gas tungsten arc welding GTAW processes used in the sheet metal industry. Equipment set up, electrode selection for various sheet metal operations and safety precautions is presented as part of the completion requirements. In addition, the student will demonstrate the ability to apply weld related metals and gauges including grooves and fillet beads in accordance with the American Welding Society.

*Lecture: 3 hours*

*Prerequisite(s): Departmental approval and a member in good standing with the sheet metal workers union.*