



**Industrial Mechanic Apprenticeship Program  
COURSE DESCRIPTIONS (ALPHABETICAL)**

for  
Inland/Desert Employers Apprenticeship Committee

Apprenticeship Training Plan: 480+ hours

**Advanced Hydraulics****32 Hours****REQUIRED COURSE**

Adds to the basic and intermediate hydraulic skills teaching advanced applications. Students will learn industry-relevant skills related to these new topics including operation, installation, performance analysis, maintenance, and design. These topics include heat exchangers, reservoirs, fluid conductors, fluid conditioning, filtration, motor performance, pump performance, system design, and maintenance. Explains inspecting hydraulic systems, diagnosing problems, and repairing systems. Shows how to read hydraulic schematic symbols.

**Advanced Pneumatics****40 Hours****REQUIRED COURSE**

Adds to the basic and intermediate pneumatic skills teaching advanced pneumatic applications. Students will learn industry-relevant skills related to these new topics including operation, installation, performance analysis, maintenance, and design. These topics include advanced pneumatic principles, pneumatic cylinder loads, cylinder applications, quick exhaust valves, motor loads, air bearings, component sizing, air compressor types, air compressor operation, flow measurement, compressor performance, air filtration, lubricators, water removal, dryers, and pneumatic component maintenance. Explains repair and maintenance of pneumatic system components. Describes troubleshooting process and methods, including pressure sensors and flow sensors. Explains how to inspect, troubleshoot, disassemble, assemble, and install a pump. Also describes the process of preparing for start-up.

**Alignment Fixtures & Specialty Jigs****8 Hours**

Explains the applications and fabrication procedures for angle iron, chain, complex reverse -indicator, Christmas tree, and piano wire jigs.

**Basic & Intermediate Hydraulics****32 Hours****REQUIRED COURSE**

Introduces hydraulic power and safety, circuits, schematics, the principles of hydraulic pressure and flow, and speed control circuits. Also builds on basic skills and includes new topics in operation, installation, performance analysis and design.

**Basic & Intermediate Pneumatics****32 Hours****REQUIRED COURSE**

Introduces pneumatic power and safety, circuits, schematics, the principles of pneumatic pressure and flow, and pneumatic speed control circuits. Also builds on basic skills and includes operation, installation, performance analysis, maintenance, and design.

**Basic Layout****24 Hours**

Discusses the tools used in layout. Explains how to lay out baselines using the arc method and 3-4-5 method.

**Bearings****16 hours****REQUIRED COURSE**

Introduces plain, ball, roller, thrust, guide, flanged, pillow block, and takeup bearings. Discusses bearing materials and designations.

**Central Lubrication****8 Hours**

The Central Lubrication Learning System teaches the technical skills needed to operate, install, tune, maintain and troubleshoot these vital systems.

**Compressors & Compressor Maintenance****16 Hours**

Describes types of compressors, their principles of maintenance, and the troubleshooting and maintenance procedures associated with compressors.

**Compressors and Pneumatic Systems****16 Hours**

Describes theory and practice of compressing and transporting gases. Explains the types and principles of compressors and compressed air treatment equipment, and compressed air use and safety.

**Contamination****8 Hours**

Contamination teaches key aspects of preventing and controlling contamination. Learners acquire skills in identifying and measuring contamination as well as prevention practices such as facility layout, cleanliness, and component handling. Provides a solid knowledge base in fluid handling and storage as well as use of clean rooms.

**Conventional Alignment****16 Hours**

Covers types of misalignment, aligning couplings using a straight edge and feeler gauge, adjusting parallel and angular alignment, using a dial indicator and eliminating coupling stress.

**Conveyors****8 Hours**

Describes the types of conveyor systems and their principles of operation.

**Fabricating Shims****8 Hours**

Describes types of shim stock and materials and explains the procedures for fabricating shims.

**Fasteners, Gaskets & Seals****8 Hours**

Fasteners – provides application knowledge regarding bolt types, size and grades, as well as screws, washers, locking nut devices, pins and keys. Gaskets – teaches about selecting, installing and storing the many types of gaskets available. Provides focus on integration and isolation seals, as well as T-joints. Covers the applications, removal, and installation procedures for dynamic and static seals, and lip, cup, oil, and labyrinth seals.

**Field Sketching****8 Hours**

Teaches the basic skills needed to create the field sketches used to convey information about how parts should be made or assembled.

**Industrial Safety****8 hours*****REQUIRED COURSE***

Covers the importance of workplace safety, OSHA regulations, and practicing safety in the workplace. Topics include personal protective equipment, hazardous communication, confined spaces, lockout/tagout, accident response and overhead crane safety.

**Installing Bearings****24 Hours**

Explains how to remove, troubleshoot, and install tapered, thrust, spherical roller, pillow block, and angular contact ball bearings.

**Installing Belt and Chain Drives****8 Hours**

Covers the sizes, uses, and installation procedures of six types of drive belts and two types of chain drives.

**Installing Couplings****16 Hours**

Identifies various types of couplings, and covers installation procedures using the press-fit method and the interference-fit method. Also covers coupling removal procedures.

**Installing Fans & Blowers****8 Hours**

Identifies and explains how to install axial-flow fans, centrifugal fans, and roots-type and screw-type blowers.

**Installing Mechanical Seals****24 Hours**

Covers function and advantages of mechanical seals, identifies parts and types of seals, and includes procedures for removing, inspecting, and installing mechanical seals.

**Installing Packing****8 Hours**

Explains the types of packing and packing materials found in a typical stuffing box. Covers how to remove packing and how to install compression packing and lip-type packing.

**Introduction to CAD Programs****24 Hours**

Covers a brief overview of AutoCAD and SolidWorks programs. Students will learn the Cartesian coordinate system, creating various drawings and views, basic program functions, and general program familiarization.

**Lubrication****8 Hours**

Describes the properties and functions of lubricants lubricant additives, oils and greases. Explains how to select lubricants. Explains the EPA hazardous waste control program and proper disposal program, lubricant storage, lubricant classification, and lubricant film protection.

**Mechanical Blueprint Reading****24 Hours**

Describes the orthographic projection, isometric, and schematic drawings used to show piping, hydraulic, and pneumatic systems. Describes the use of drawings sets to obtain information about a system; explains the process of identifying a part of a machine for repair or replacement from a set of drawings.

**Mechanical Drives I****24 Hours*****REQUIRED COURSE***

Introduces mechanical systems and develops fundamental knowledge of mechanical practices. Topics may include basic safety, installation, v-belt drives, lubrication, maintenance and troubleshooting of plain ball bearings.

**Mechanical Drive II****8 Hours**

Includes the functions of brakes and clutches, specialized bearings used in linear drives and guide functions, and various types of conveyors. Discusses design, operation, purpose, maintenance and troubleshooting.

**Piping Components & Practices****24 hours*****REQUIRED COURSE***

Covers various types of iron and steel pipe and fittings and provides step-by-step instructions for cutting, threading, and joining ferrous piping. Introduces chemical, compressed air, fuel oil, steam, and water systems. Explains how to identify piping systems according to color codes. Explains how to remove and install threaded and flanged valves, how to replace valve stem O-ring and bonnet gaskets, and how to repack a valve stuffing box. Also discusses the purpose of valve packing. Covers the selection, preparation, joining, and support of copper, plastic piping, and fittings.

**Pre-Alignment for Equipment Installation****16 Hours*****REQUIRED COURSE***

Explains how to level equipment using jack bolts, wedges, and shims. Covers precision leveling procedures and performing clearance installation. Also describes basic steps for setting motors and pumps.

**Precision Measuring Tools****16 Hours*****REQUIRED COURSE***

Explains how to select, inspect, use and care for levels, feeler gauges, calipers, micrometers, height gauges and surface plates, dial indicators, protractors, parallels and gauge blocks, trammels, and pyrometers.

**Preventative and Predictive Maintenance****40 Hours*****REQUIRED COURSE***

Explains preventive and descriptive maintenance and nondestructive testing, and introduces the basic techniques for testing. Also describes lubricant analysis, and acoustic, infrared, and vibration testing.

**Principles of Materials****8 Hours**

Principles of materials – non-ferrous metals introduces the properties, elements, and types of non-ferrous materials commonly employed in metal manufacturing. Covers the basics of the non-ferrous material manufacturing process, the elements used to create non-ferrous materials, the main types of non-ferrous materials and their properties, and the common tests used to measure metal properties. Introduces the properties, processes, skills, and concepts of working with plastics. Introduces the importance, properties, processes, and skills of working with composites. Introduces the importance, properties, processes, and skills of working with ceramics. Principles of materials – ferrous metals introduces the properties, elements, and types of ferrous materials commonly employed in metal manufacturing.

**Pumps****24 Hours*****REQUIRED COURSE***

Describes the common types of pumps and their principles of operation. Explains centrifugal, rotary, reciprocating and metering pumps. Also explains net positive suction head and cavitation. Explains how to inspect, troubleshoot, disassemble, assemble, and install a pump. Also describes the process of preparing for start-up.

**Rigging****24 Hours**

Explains how to identify, select, and inspect rigging hardware. Also covers lifting capacity charts, load balancing, and pick points. Covers the operation, function, and maintenance of wire mesh slings and fiber ropes, load movement, and rigging knots. Proper rigging techniques are vital for efficient movement of loads and worker safety.

**Setting Baseplates & Soleplates****16 Hours**

Explains how to lay out and install baseplates and soleplates. Describes how to field-verify a plate installation. Covers precision leveling procedures and performing clearance installation. Also describes basic steps for setting motors and pumps.

**Specialty Tools****8 Hours**

Explains how to select, inspect, use and maintain torque multipliers, cable cutters, nut splitters, keyseat gauges, and hardness testers.

**Trade Math****24 Hours**

Explains how to use tables of equivalents and conversion tables, figure ratios and proportions, perform right angle trigonometry, calculate take-outs using trigonometry, and calculate volumes and weights of objects. Explains right triangle trigonometry and its use in the trade. Also covers interpolation, equilateral and isosceles triangles, and the laws of acute triangles.

**Troubleshooting & Repairing Conveyors****8 Hours**

Describes maintaining and repairing belt, roller, chain, screw, and pneumatic conveyors.

**Troubleshooting and Repairing Gearboxes****24 Hours*****REQUIRED COURSE***

Describes types and operation of gearboxes, and gearbox diagnostics. Explains how to troubleshoot, remove, and disassemble gearboxes, how to identify gear wear patterns, and how to install and maintain gearboxes.

**Vibration Analysis****16 Hours**

Explains the causes of vibration and the procedures and types of equipment used in vibration analysis. Describes the kinds of equipment used for vibration testing and monitoring. Describes field machine balancing.

## Industrial Mechanic Training Modules

Required	Course	Hours
*	<b>Advanced Hydraulics</b>	<b>32</b>
*	<b>Advanced Pneumatics</b>	<b>40</b>
	Alignment Fixtures & Specialty Jigs	<b>8</b>
*	<b>Basic &amp; Intermediate Hydraulics</b>	<b>32</b>
*	<b>Basic &amp; Intermediate Pneumatics</b>	<b>32</b>
	Basic Layout	<b>24</b>
*	<b>Bearings</b>	<b>16</b>
	Central Lubrication	<b>8</b>
	Compressors & Compressor Maintenance	<b>16</b>
	Compressors and Pneumatic Systems	<b>16</b>
	Contamination	<b>8</b>
	Conventional Alignment	<b>16</b>
	Conveyors	<b>8</b>
	Copper & Plastic Piping Practices	<b>8</b>
	Fabricating Shims	<b>8</b>
	Fasteners, Gaskets & Seals	<b>8</b>
	Field Sketching	<b>8</b>
*	<b>Industrial Safety</b>	<b>8</b>
	Installing Bearings	<b>24</b>
	Installing Belt and Chain Drives	<b>8</b>
	Installing Couplings	<b>16</b>
	Installing Fans & Blowers	<b>8</b>
	Installing Mechanical Seals	<b>24</b>
	Installing Packing	<b>8</b>
	Introduction to CAD Programs	<b>24</b>
	Lubrication	<b>8</b>
	Mechanical Blueprint Reading	<b>24</b>
*	<b>Mechanical Drives I</b>	<b>24</b>
*	Mechanical Drives II	<b>8</b>
*	<b>Piping Components &amp; Practices</b>	<b>24</b>
*	<b>Pre-Alignment for Equipment Installation</b>	<b>16</b>
*	<b>Precision Measuring Tools</b>	<b>16</b>

*	<b>Preventative and Predictive Maintenance</b>	<b>40</b>
	Principles of Materials	<b>8</b>
*	<b>Pumps</b>	<b>24</b>
	Rigging	<b>24</b>
	Setting Baseplates & Soleplates	<b>16</b>
	Specialty Tools	<b>8</b>
	Troubleshooting & Repairing Conveyors	<b>8</b>
*	<b>Troubleshooting and Repairing Gearboxes</b>	<b>24</b>
	Vibration Analysis	<b>16</b>



## Industrial Mechanic Recommended Class Schedule

Below are the recommended classes and schedule for an IM apprentice to take. They can be taken within two to four years. Additional supplemental classes will be available based on demand.

Contact your Chaffey College InTech Center representative for more information.

Training Title	Scheduled Day	Hours	Days
<b>Year 1, Quarter 1</b>	<i>7:30AM-3:30PM</i>		
Industrial Safety	Friday	8	1
Principles of Materials	Friday	8	1
Piping Components & Practices	Friday	24	3
Trade Math	Friday	40	5
<b>Year 1, Quarter 2</b>			
Lubrication	Friday	8	1
Rigging	Friday	24	3
Mechanical Blueprint Reading	Friday	24	3
<b>Year 1, Quarter 3</b>			
Basic & Intermediate Hydraulics	Friday	32	4
Basic & Intermediate Pneumatics	Friday	24	3
<b>Year 1, Quarter 4</b>			
Basic & Intermediate Pneumatics (cont.)	Friday	8	1
Pumps	Friday	24	3
Mechanical Drives	Friday	24	3
<b>Year 2, Quarter 1</b>			
Fasteners, Gaskets & Seals	Saturday	8	1
Precision Measuring Tools	Saturday	16	2
Bearings	Saturday	16	2
Installing Couplings	Saturday	16	2
Advanced Pneumatics	Saturday	24	3
<b>Year 2, Quarter 2</b>			
Advanced Pneumatics (cont.)	Saturday	16	2
Advanced Hydraulics	Saturday	32	4
Conventional Alignment	Saturday	16	2
<b>Year 2, Quarter 3</b>			
Pre-Alignment for Equipment Installation	Saturday	16	2
Conveyors	Saturday	8	1
Troubleshooting & Repairing Gearboxes	Saturday	24	3
<b>Year 2, Quarter 4</b>			
Preventative & Predictive Maintenance	Saturday	40	5
		<b>480</b>	<b>60</b>