American River College conducts, in cooperation with industry, a number of apprenticeship programs. An apprenticeship program is a formal system of occupational training from one to five years, that combines paid employment, on-the-job training and job related college instruction in order to develop skilled workers.

Apprenticeship programs are a cooperative effort between employers, the Department of Labor (DOL) and/or the Division of Apprenticeship Standards (DAS), and the college.

Enrollment in an apprenticeship course is limited to registered apprentices. Information on admission to apprenticeship status can be obtained from the local trade in which you are interested, or from the office of the Dean of Technical Education.

### DEGREES AND CERTIFICATES

#### Carpenter Apprenticeship

**Major Code, degree:** 011247A01
**Major Code, certificate:** 011247C01

This program concentrates on training apprentices to the specific levels required for the construction industry and has been approved by the State of California Department of Apprenticeship Standards. It includes safety, blueprint reading, residential and commercial construction processes, building codes, estimation, and various carpentry topics.

**Student Learning Outcomes**

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

- demonstrate safe working practices in a field construction environment.
- demonstrate proper selection, use, care, preparation, and handling of the carpenter’s tools of the trade.
- analyze, interpret, and apply national building codes relating to carpentry.

**Career Opportunities**

Upon completion of the Carpenter Apprenticeship degree or certificate, students may find employment in the following sectors: government, residential and commercial construction and maintenance, utilities, and facilities management. Students may also further their career as a licensed contractor after completing the degree program.

For more information, contact:

Program Director
800 Chadbourne Rd, Suite A
Fairfield, CA 95485
(707) 399-2880

See losrios.edu/gainful-emp-info/geinfo.php?major=011247C01 for Gainful Employment Disclosure.

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<td>CARPT 107 Rigging</td>
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<tr>
<td>CARPT 110 Foundations and Floors</td>
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<tr>
<td>CARPT 112 Structural Framing</td>
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<tr>
<td>CARPT 114 Form Detailing, Construction &amp; Erection</td>
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<tr>
<td>CARPT 120 Exterior Finish</td>
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<tr>
<td>CARPT 122 Interior Finish</td>
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CARPT 124 Commercial Door Hardware .................................................. 1.5
CARPT 130 Layout/Leveling Construction Site Practice ...................................... 1.5
CARPT 140 Interior Systems ........................................................................... 1.3
CARPT 142 Engineered Structural Systems .......................................................... 1
CARPT 150 Concrete - Precast and Prestressed ............................................... 1
CARPT 155 Commercial Concrete ................................................................. 1.5
CARPT 160 Blueprint Reading-Residential ..................................................... 1.3
CARPT 162 Blueprint Reading-Commercial .................................................... 1.3
CARPT 170 Roof Framing ............................................................................. 1
CARPT 180 Stair Building .............................................................................. 1
CARPT 190 Introduction to Welding and Cutting ................................................ 1
And a minimum of 16 units from the following: .............................................. 16
CARPT 298 Work Experience in Carpenters Apprenticeship (1 - 4)

Associate Degree Requirements: The Carpenter Apprenticeship Associate in Arts (A.A.) Degree may be obtained by completion of the required program, plus general education requirements, plus sufficient electives to meet a 60-unit total. See ARC graduation requirements.

Drywall/Lathing Apprenticeship

Major Code, degree: 011512A01
Major Code, certificate: 011512C01

The Drywall/Lathing Apprenticeship program concentrates on training apprentices to the specific levels required for the construction industry and has been approved by the State of California Department of Apprenticeship Standards. Training emphasis includes safety, metal framing, blueprint reading, exterior/interior wall finishes, welding, residential and commercial construction process, building codes, estimation, and various construction topics.

Student Learning Outcomes

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

- demonstrate safe working practices in a field construction environment.
- demonstrate proper selection, use, care, preparation, and handling of the drywall/lathing craftsman’s tools of the trade.
- analyze, interpret, and apply national building codes relating to the drywall/lathing profession.
- analyze and interpret residential commercial construction blueprints.
- evaluate, layout, and construct various metal framing systems such as floor, wall, roof, and arches.
- calculate elevations using various leveling devices.
- identify and select appropriate material for each phase of construction.
- estimate and order material for construction projects.
- plan projects with given information such as blueprints, specifications, verbal and written information.

Career Opportunities

Upon completion of the Drywall/Lathing Apprenticeship degree, students may find employment in the following sectors: government, residential and commercial construction and maintenance, utilities, and facilities management. Students may further their career as a licensed contractor.

For more information contact:

Program Director
8000 Chadbourne Rd, Suite A
Fairfield, CA 95485
(707) 399-2880

See losrios.edu/gainful-emp-info/gedt.php?major=011512C01 for Gainful Employment Disclosure.

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<td>DRLTH 102 Basic Applications .................................................................................. 1.5</td>
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<td>DRLTH 105 Mathematics for Drywall/Lathers ................................................................ 2</td>
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<td>DRLTH 110 Residential Metal Framing ........................................................................ 1.5</td>
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<td>DRLTH 112 Doors, Windows, Exterior Systems/Building Documents .............................. 1.5</td>
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<td>DRLTH 120 Blueprint Reading I ................................................................................... 1.5</td>
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<td>DRLTH 131 Welding II ............................................................................................... 1.5</td>
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<td>DRLTH 140 Exterior/Advanced Fire Control System and Partitions .............................. 1.5</td>
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<tr>
<td>DRLTH 142 Exterior Systems and Trims ....................................................................... 1.5</td>
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<tr>
<td>DRLTH 150 Interior Metal Lathing System, Sound Control ........................................... 1.5</td>
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<td>DRLTH 152 Ceilings, Shaft Protection and Demountable Partitions ............................. 1.5</td>
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<tr>
<td>DRLTH 162 Arches, Furring and Advanced Systems ..................................................... 1.5</td>
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<tr>
<td>DRLTH 170 Advanced Construction Techniques .......................................................... 1.5</td>
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</table>

And a minimum of 16 units from the following: .............................................. 16
DRLTH 298 Work Experience Drywall/Lathing Apprenticeship (1 - 4)

Associate Degree Requirements: The Drywall/Lathing Apprenticeship Associate in Arts (A.A.) Degree may be obtained by completion of the required program, plus general education requirements, plus sufficient electives to meet a 60-unit total. See ARC graduation requirements.

Electrical Apprenticeship

Major Code, degree: 011303A01
Major Code, certificate: 011303C01

This program provides instruction in the installation, operation, and maintenance of the electrical distribution systems in commercial and industrial sites. Topics include safety training, AC and DC electrical theory, metering, electronics, use of electrical codes, raceways, conductors, grounding, motors, transformers, fire alarm systems, fiber optics, instrumentation, building automation and heating, ventilating and air conditioning (HVAC) systems.

Student Learning Outcomes

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

- apply commercial and industrial safety procedures on job sites.
- analyze, interpret and apply national, state and local electrical codes.
- apply mathematics in calculating ac and dc series, parallel, and combination circuits.
- identify different wiring methods for conductors, cables, and conduits.
- analyze functions of blueprints, specifications, schedules, addenda and revisions in construction.
- describe the function, operation and characteristics of a system and individual components of the system such as burglar alarms, fire alarms, information transport, HVAC, etc.
- describe functions of instrumentation in industrial process control systems.
**APPRENTICESHIP**

**American River College Catalog 2019-2020**

**Graduation Requirements.** (A.A.) Degree may be obtained by completion of the required program, plus general education requirements. Upon completion of this program, the student will be able to:

- define, identify, interpret, and analyze uniform building codes (UBC), classifications, plans, schedules, charts, and specifications commonly used in the ironworker trade.
- describe the function, operation and characteristics of a system and individual components of the system such as burglar alarms, fire alarms, information transport, HVAC, etc.
- perform proper structural steel erection on bridges, overpasses, and large buildings.
- weld various ferrous metals using common welding processes and safety guidelines.
- set cable tensions and pre-stress reinforcing steel to industry standards.

**Requirements for Degree or Certificate**

<table>
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<tr>
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<th>Units</th>
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<td>ELECT 154</td>
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<tr>
<td>ELECT 155</td>
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<tr>
<td>ELECT 156</td>
<td>Structural I</td>
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<td>ELECT 157</td>
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<td>Reinforcing I</td>
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<td>IW 131</td>
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<td>Precast Concrete and Metal Buildings</td>
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<tr>
<td>IW 155</td>
<td>The History of Ironworkers</td>
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<tr>
<td>ELECT 298</td>
<td>Work Experience in Electricians Apprenticeship (1-4)</td>
<td>16</td>
</tr>
</tbody>
</table>

**Ironworkers Apprenticeship**

**Major Code, degree: 011580A01**

**Major Code, certificate: 011580C01**

This program includes training for Field Ironworkers and Rebar Ironworkers, provided in major ironworker components to meet Division of Apprenticeship Standards (DAS) guidelines.

For more information contact:
Program Director
3524 51st Ave
Sacramento, CA 95823
(916) 428-7420

See losrios.edu/gainful-emp-info/gedt.php?major=011580C01 for Gainful Employment Disclosure

**Student Learning Outcomes**

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

- perform proper structural steel erection on bridges, overpasses, and large buildings.
- weld various ferrous metals using common welding processes and safety guidelines.
- set cable tensions and pre-stress reinforcing steel to industry standards.

- demonstrate safe working practices in a field construction environment.
- analyze and interpret blueprints.
- interpret and apply welding codes.
- demonstrate proper selection, use, care, preparation, and handling of fiber lines, steel cables, wire ropes, chains, slings, cranes, ladders, scaffolds and helicopter rigging.
- define, identify, interpret, and analyze uniform building codes (UBC), classifications, plans, schedules, charts, and specifications commonly used in the ironworker trade.
- describe and apply reinforcing techniques and principles to concrete structures using steel, bar supports, bar splicing and welding.

For more information contact:
Program Director
2836 El Centro Rd.
Sacramento, CA 95833
(916) 646-6688

**Requirements for Degree or Certificate**

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**Associate Degree Requirements:** The Ironworkers Apprenticeship Associate in Arts (A.A.) Degree may be obtained by completion of the required program, plus general education requirements, plus sufficient electives to meet a 60-unit total. See ARC graduation requirements.

**Residential/Commercial Electrician Trainee Certificate**

**Major Code: 011583C01**

This program provides instruction in the installation, operation, and maintenance of the electrical distribution systems in residential and commercial sites. Topics include safety training, AC/DC electrical theory, metering, electronics, use of electrical codes, raceways, conductors, grounding, motors, transformers, fire alarm systems, fiber optics, and Heating, Ventilation, and Air Conditioning (HVAC) systems. It complies with state regulations to become an electrician trainee.

**Student Learning Outcomes**

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

- apply residential and commercial safety procedures on job-sites.
- analyze, interpret and apply national, state and local electrical codes.
- apply electrical mathematics in calculating AC/DC series, parallel, and combination circuits.
- identify different wiring methods for conductors, cables, and conduits.
- analyze functions of blueprints, specifications, schedules, addenda and revisions in construction.
- describe the function, operation and characteristics of a system and individual components of the system such as burglar alarms, fire alarms, information transport, HVAC, etc.
**Career Opportunities**

Upon completion of the Residential/Commercial Electrician Trainee program, students may find employment in the following industry sectors: government, residential and commercial construction and maintenance, utilities, and facilities management.

**Requirements for Certificate** 28.5 Units

- ELTRN 110 Electrician Trainee I .................................................. 4
- ELTRN 111 Electrician Trainee II .................................................... 4
- ELTRN 120 Electrician Trainee III .................................................... 4
- ELTRN 121 Electrician Trainee IV .................................................... 4
- ELTRN 130 Electrician Trainee V .................................................... 4
- ELTRN 131 Electrician Trainee VI .................................................... 4
- ELTRN 180 Electrical Workers State Certification Preparation .............. 4.5

**Sheet Metal Apprenticeship**

**Major Code, degree:** 011249A01

**Major Code, certificate:** 011249C01

The Sheet Metal Apprenticeship certificate concentrates on training apprentices to the specific levels required for the construction industry and has been approved by the State of California Department of Apprenticeship Standards. Training emphasis includes safety, blueprint reading, residential and commercial processes, building codes, estimation, and various sheet metal topics.

**Student Learning Outcomes**

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

- demonstrate safe working practices in a field construction environment.
- demonstrate proper selection, use, care, preparation, and handling of the sheet metal worker's tools of the trade.
- analyze, interpret, and apply national building codes relating to sheet metal construction.
- analyze and interpret residential and commercial construction blueprints.
- acquire skills and knowledge to make a successful transition to a journey-level position in the sheet metal worker trade.
- demonstrate the ability to apply mathematical concepts to the sheet metal trade.
- demonstrate proficiency in the principles, concepts and applications in metal fabrication methods.

**Career Opportunities**

Upon completion of the Sheet Metal Apprenticeship program, students may find employment in the following sectors: government, residential and commercial construction and maintenance, utilities, and facilities management. Students may further their career as a licensed contractor.

For more information contact:

Program Director
1624 Silica Avenue
Sacramento, CA 95815
(916) 922-9381

See losrios.edu/gainful-emp-info/gedt.php?major=011249C01 for Gainful Employment Disclosure

**Requirements for Certificate** 28 Units

- SHME 100 Sheet Metal Apprenticeship I ............................................. 3
- SHME 101 Sheet Metal Apprenticeship II .......................................... 3
- SHME 110 Sheet Metal Apprenticeship III ......................................... 3
- SHME 111 Sheet Metal Apprenticeship IV ......................................... 3
- SHME 120 Sheet Metal Apprenticeship V ......................................... 3
- SHME 121 Sheet Metal Apprenticeship VI ......................................... 3
- SHME 130 Sheet Metal Apprenticeship VII ....................................... 3
- SHME 131 Sheet Metal Apprenticeship VIII ..................................... 3
- SHME 140 Sheet Metal Apprenticeship IX ....................................... 3.3
- SHME 141 Sheet Metal Apprenticeship X ....................................... 3.3
- SHME 150 Sheet Metal Welding I ...................................................... 2.5
- SHME 151 Sheet Metal Welding II ...................................................... 2.5

A minimum of 16 units from the following: .......................... 16

SHME 298 Work Experience in Sheet Metal Apprenticeship (1 - 4)

**Associate Degree Requirements:**

The Sheet Metal Apprenticeship Associate in Arts (A.A.) Degree may be obtained by completion of the required program, plus general education requirements, plus sufficient electives to meet a 60-unit total. See ARC graduation requirements.

**Sheet Metal Residential Apprenticeship**

**Major Code:** 011390C01

This is a two-year, four-semester certificated Sheet Metal Residential Apprenticeship Program. The program concentrates on training apprentices to the specific levels required for residential and light commercial construction sites and has been approved by the State of California Department of Apprenticeship Standards.

**Enrollment Eligibility**

To be eligible for enrollment in the program, the student must meet the following criteria:

- Must be a Registered Sheet Metal Residential Apprentice

**Student Learning Outcomes**

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

- apply safety procedures on residential job-sites.
- analyze and interpret residential construction blueprints.
- apply construction mathematics in calculating pattern development of sheet metal products.
- identify various metals, gages, fasteners, and sealants used in sheet metal fabrication.
- design and size a residential duct system.
- demonstrate proper soldering on sheet metal fabrication.

**Career Opportunities**

Upon completion of the Sheet Metal Residential Apprenticeship program, students may find employment in the following industry sectors: government, residential, and light commercial construction and maintenance. See losrios.edu/gainful-emp-info/gedt.php?major=011390C01 for Gainful Employment Disclosure.

**Requirements for Certificate** 28 Units

- SMRA 100 Sheet Metal Residential Apprenticeship I .......................... 3
- SMRA 101 Sheet Metal Residential Apprenticeship II ......................... 3
- SMRA 110 Sheet Metal Residential Apprenticeship III ....................... 3
- SMRA 111 Sheet Metal Residential Apprenticeship IV ....................... 3

A minimum of 16 units from the following: .......................... 16

SMRA 298 Work Experience in Sheet Metal Apprenticeship (1 - 4)
Sheet Metal Service Technician Apprenticeship

Major Code, degree: 01X0318A01
Major Code, certificate: 01X0318C01

The Sheet Metal Service Technician Apprenticeship Associate of Arts and certificate concentrates on training apprentices to the specific levels required for the construction and the heating, ventilation, and air conditioning (HVAC) industries. This program has been approved by the State of California Department of Apprenticeship Standards. Training emphasis includes safety, blueprint reading, residential and commercial processes, building codes, estimation, and various sheet metal topics.

It includes the servicing, start-up, and balancing of HVAC systems.

Student Learning Outcomes

Upon completion of this program, the student will be able to:
- demonstrate safe working practices in a field construction environment.
- demonstrate proper selection, use, care, preparation, and handling of the sheet metal worker’s tools of the trade.
- analyze, interpret, and apply national building codes relating to sheet metal and mechanical construction.
- analyze and interpret residential and commercial construction blueprints.
- demonstrate the proper start-up and balancing of different HVAC systems.
- demonstrate troubleshooting techniques on various HVAC systems.

Career Opportunities

Upon completion of the Sheet Metal Service Technician Apprenticeship certificate, students may find employment in the following sectors: government, residential and commercial construction and maintenance, HVAC servicing, utilities, facilities management, and central plant operations. Students may further their career as a licensed contractor.

See losrios.edu/gainful-emp-info/gedt.php?major=01X0318C01 for Gainful Employment Disclosure.

Pre-Apprenticeship Certificate

Major Code: 011246C01

This program prepares students for entry into an apprenticeship program in the commercial and industrial building and construction industries. Topics include Leadership in Energy and Environmental Design (LEED) processes, green technologies, green building techniques, infrastructure, and transportation projects.

Student Learning Outcomes

Upon completion of this program, the student will be able to:
- describe basic skills required for the construction of roads, bridges, levees, and rail.
- describe the Leadership in Energy and Environmental Design (LEED) rating process.
- identify green alternatives to conventional building practices and describe the pros and cons of those alternatives.
- apply proper lifting/movement techniques applicable to green technology workforce occupations.
- determine the validity of fitness and health information using the scientific method and the relationship between scientific research and established knowledge.
- implement a personal fitness plan using proper strength and cardiovascular training.

See losrios.edu/gainful-emp-info/gedt.php?major=011246C01 for Gainful Employment Disclosure.

DEPARTMENT CERTIFICATES

Green Technology Pre-Apprenticeship Certificate

This certificate prepares students for entry into an apprenticeship program in the commercial and industrial building and construction industries. Topics include green building practices, construction job site safety requirements, construction mathematics, and apprenticeship entry requirements.

Student Learning Outcomes

Upon completion of this program, the student will be able to:
- explain safety regulations and safe working conditions for apprenticeship training.
- identify construction practices used by different building trades such as sheet metal workers, electricians, plumbers, pipe-fitters, and carpenters.
- describe the life cycle phases of a building and impacts on the green environment over its life cycle.

Requirements for Certificate

<table>
<thead>
<tr>
<th>Program</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>PREAP 111</td>
<td>Infrastructure Pre-Apprenticeship</td>
</tr>
<tr>
<td>PREAP 141</td>
<td>Green Technology Pre-Apprenticeship</td>
</tr>
<tr>
<td>FITNS 101</td>
<td>Green Technology Workforce Wellness</td>
</tr>
<tr>
<td>FITNS 102</td>
<td>Infrastructure Workforce Wellness</td>
</tr>
</tbody>
</table>

Associate Degree Requirements: The Sheet Metal Service Technician Apprenticeship Associate in Arts (A.A.) Degree may be obtained by completion of the required program, plus general education requirements, plus sufficient electives to meet a 60-unit total. See ARC graduation requirements.
**Infrastructure Pre-Apprenticeship Certificate**

This certificate prepares students for entry into an apprenticeship program in the infrastructure industries such as bridge, levee, and road construction. Topics include bridge construction practices, construction job site safety requirements, construction mathematics, and apprenticeship entry requirements.

**Student Learning Outcomes**

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

- explain safety regulations and safe working conditions for apprenticeship training.
- identify construction practices used by different building trades such as carpenters, bricklayers, pile-drivers, cement masons, laborers, operating engineers, and surveyors.
- describe the construction processes involved in a typical bridge building.

**Requirements for Certificate** 8 Units

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FITNS 102</td>
<td>Infrastructure Workforce Wellness</td>
</tr>
<tr>
<td>PREAP 111</td>
<td>Infrastructure Pre-Apprenticeship</td>
</tr>
</tbody>
</table>

**Utilities Worker Pre-Apprenticeship Certificate**

This certificate prepares students for entry into an apprenticeship program in the utility industry. Topics include job-site safety requirements, blueprint reading, electrical power distribution, utility pole climbing, and apprenticeship preparation.

**Student Learning Outcomes**

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

- explain electrical fundamentals such as Ohm's and Watt's Law.
- define terms and vocabulary used in the utility industry.
- explain electrical and gas distribution for the utility industry.
- identify safety laws, regulations, and safe working conditions for apprenticeship.
- describe effective conflict resolution methods.
- describe the functions of transformers, electrical generators, and electrical equipment.

**Career Opportunities**

This program provides opportunities for entry into the utility industry where there is high demand for trained entry level workers.

**Requirements for Certificate** 10.5 Units

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FITNS 100</td>
<td>Utility Workforce Wellness</td>
</tr>
<tr>
<td>PREAP 122</td>
<td>Pre-Apprenticeship for Utility Workers</td>
</tr>
<tr>
<td>MATH 145</td>
<td>Mathematics for the Trades</td>
</tr>
</tbody>
</table>

**Carpenters Apprenticeship**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CARPT 101</td>
<td>Aerial Lift Safety, Construction Math, and the Apprentice</td>
<td>1.5</td>
</tr>
<tr>
<td>Enrollment Limitation: Must be a registered carpenter Apprentice.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hours: 24 hours LEC; 12 hours LAB</td>
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</tbody>
</table>

This course introduces the beginning carpenter apprentice to industry safety procedures for aerial lift use, and hand and power tool safety and maintenance. It also covers construction math, financial literacy, and the role and responsibilities of the apprentice.

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CARPT 106</td>
<td>Introduction to Apprenticeship</td>
<td>1.5</td>
</tr>
<tr>
<td>Enrollment Limitation: Registered Carpenter Apprentice.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hours: 22 hours LEC; 15 hours LAB</td>
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</tbody>
</table>

This course is an introduction to apprenticeship, tools, safety, and construction job sites in the commercial and industrial building sectors.

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CARPT 107</td>
<td>Rigging</td>
<td>1.5</td>
</tr>
<tr>
<td>Enrollment Limitation: Registered Carpenter Apprentice.</td>
<td></td>
<td></td>
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<tr>
<td>Hours: 22 hours LEC; 15 hours LAB</td>
<td></td>
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</tbody>
</table>

This course familiarizes apprentices with the equipment and the procedures to safely rig and hoist various loads on the job-site. Topics include tying knots, splicing rope, calculating loads, hand signals for cranes, and inspecting rigging hardware.

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CARPT 108</td>
<td>Modular System Installer Safety</td>
<td>1.5</td>
</tr>
<tr>
<td>Enrollment Limitation: Must be a registered carpentry modular systems installer apprentice.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hours: 24 hours LEC; 12 hours LAB</td>
<td></td>
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</tbody>
</table>

This course is an introduction to apprenticeship, tools, safety, and construction job sites in the commercial and industrial building sectors. It also covers discrimination and harassment on the job-site.

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CARPT 109</td>
<td>Introduction to Office Modular Systems Installation</td>
<td>1</td>
</tr>
<tr>
<td>Enrollment Limitation: Must be a registered carpentry modular systems installer apprentice.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hours: 18 hours LEC; 18 hours LAB</td>
<td></td>
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</tbody>
</table>

This course introduces the installation of modular systems including major manufacturers of modular systems, applicable math, blueprints, specifications, and the creation of a realistic installation mockup. It also covers site logistics, layout of components, and personal financial literacy.

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CARPT 110</td>
<td>Foundations and Floors</td>
<td>1.5</td>
</tr>
<tr>
<td>Enrollment Limitation: Must be a registered Carpenter Apprentice.</td>
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<td></td>
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<tr>
<td>Hours: 22 hours LEC; 15 hours LAB</td>
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</tbody>
</table>

This course covers layout, forming, framing, joist, sub-flooring, and foundation construction.

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CARPT 111</td>
<td>Modular Systems Applications</td>
<td>1</td>
</tr>
<tr>
<td>Enrollment Limitation: Must be a registered carpentry modular systems installer apprentice.</td>
<td></td>
<td></td>
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<tr>
<td>Hours: 15 hours LEC; 21 hours LAB</td>
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</tbody>
</table>

This course introduces the modular system installer apprentice to proper tool and equipment applications required while assembling and disassembling modular office furniture systems. It also covers personal financial literacy.

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CARPT 112</td>
<td>Structural Framing</td>
<td>1.5</td>
</tr>
<tr>
<td>Enrollment Limitation: Must be a registered Carpenter Apprentice.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hours: 22 hours LEC; 15 hours LAB</td>
<td></td>
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</tr>
</tbody>
</table>

This course covers basic framing systems and layout of walls, ceilings, and stairwells with wood as well as metal and alternative “green” materials such as manufactured panels.
CARPT 114 Form Detailing, Construction & Erection 1 Unit
Enrollment Limitation: Must be a registered Carpenter Apprentice.
Hours: 9 hours LEC; 27 hours LAB
This course covers planning and building of form work, construction and erection of various concrete forms, and construction materials and methods. New building materials such as recycled and alternative materials are explored.

CARPT 115 Floor to Ceiling Wall System Construction 1 Unit
Enrollment Limitation: Must be a registered carpentry modular systems installer apprentice.
Hours: 11 hours LEC; 25 hours LAB
This course introduces the modular system installer apprentice to floor to ceiling modular wall construction. It also covers blueprint reading and understanding manufacturers’ system components and parts.

CARPT 120 Exterior Finish 1.5 Units
Enrollment Limitation: Must be a registered Carpenter Apprentice.
Hours: 22 hours LEC; 15 hours LAB
This course covers exterior design, materials, finishes, and methods of application in exterior building construction. Topics include an overview of the hazards of Volatile Organic Compounds (VOCs) and pathogens.

CARPT 122 Interior Finish 1.5 Units
Enrollment Limitation: Must be a registered Carpenter Apprentice.
Hours: 22 hours LEC; 15 hours LAB
This course covers interior designs, materials, and methods of application in building construction. Topics include techniques of indoor air quality practices in order to reduce Volatile Organic Compounds (VOCs) and pathogens.

CARPT 124 Commercial Door Hardware 1.5 Units
Enrollment Limitation: Registered Carpenter Apprentice
Hours: 22 hours LEC; 15 hours LAB
This course covers the basic skills necessary to successfully install commercial door hardware. Topics include selecting hardware, hanging and adjusting a door and installing locks, closers, rim devices, door holders, and various accessories. It also covers codes that govern doors and hardware in commercial buildings.

CARPT 125 Fine Furnishings, Drapery, and Window Coverings 1 Unit
Enrollment Limitation: Must be a registered carpentry modular systems installer apprentice.
Hours: 13 hours LEC; 23 hours LAB
This course introduces the modular system installer apprentice to high-end and custom furniture, wall installations, draperies, and window coverings. It also covers tool selection, skills for proper installation, and manufacturers’ specifications.

CARPT 130 Layout/Leveling Construction Site Practice 1.5 Units
Enrollment Limitation: Must be a registered Carpenter Apprentice.
Hours: 22.5 hours LEC; 13.5 hours LAB
This course covers the use of leveling devices. It includes reading and interpreting an engineer’s rod, horizontal and vertical setting circles, and vernier scaling. Additional topics include construction layout of horizontal and vertical angles, and Leadership in Energy and Environmental Design (LEED) practices for erosion control.

CARPT 131 Introduction to Working Drawings, Construction Math and Fire Stop Installation 1.5 Units
Enrollment Limitation: Must be a registered Insulator Apprentice.
Hours: 24 hours LEC; 12 hours LAB
This course introduces Insulator Apprentices to construction math, basic blueprint reading, and fire stop installation. It also covers safe use and maintenance of hand tools.

CARPT 132 Residential Blueprint Reading and Forklift Safety 1.5 Units
Enrollment Limitation: Must be a registered Insulator Apprentice.
Hours: 24 hours LEC; 12 hours LAB
This course introduces Insulator Apprentices to residential blueprint terminology and interpretation. Forklift safety is also included.

CARPT 133 Residential Insulation and Weatherization 1.5 Units
Enrollment Limitation: Must be a registered Insulator Apprentice.
Hours: 24 hours LEC; 12 hours LAB
This course introduces the Insulator Apprentice to insulation and weatherization installation. Topics include environmental impact on traditional construction and organizations that provide guidelines and certification for residential insulation and weatherization.

CARPT 134 Commercial Blueprint Reading and Mobile Tower Scaffolds 1.5 Units
Enrollment Limitation: Must be a registered Insulator Apprentice.
Hours: 24 hours LEC; 12 hours LAB
This course introduces Insulator Apprentices to commercial blueprint terminology and interpretation. It also covers the erection of and safe practices for welded frame mobile and rolling tower scaffolds.

CARPT 135 Commercial and Industrial Insulation and Aerial Lift 1.5 Units
Enrollment Limitation: Must be a registered Insulator Apprentice.
Hours: 24 hours LEC; 12 hours LAB
This course introduces the Insulator Apprentice to commercial and industrial insulation installation. It also covers the rules and regulations governing the safe use of aerial lifts.

CARPT 136 Energy Conservation Codes and Standards 1.5 Units
Enrollment Limitation: Must be a registered Insulator Apprentice.
Hours: 24 hours LEC; 12 hours LAB
This course introduces the Insulator Apprentice to energy conservation codes and standards. It also covers Green Advantage certification and CalGreen building code requirements.

CARPT 137 Modular Systems Construction I 1 Unit
Enrollment Limitation: Must be a registered carpentry modular systems installer apprentice.
Hours: 18 hours LEC; 18 hours LAB
This course introduces the modular system installer apprentices to safe and productive ways to handle modular components on a job site using the proper equipment. It also covers the proper way to lift and move modular components, protection of office equipment, basic furniture assembly, and manufacturers’ specifications.

CARPT 138 Modular System Construction II 1 Unit
Hours: 14 hours LEC; 22 hours LAB
This course introduces the modular system installer apprentices to advanced modular system construction with a focus on panelized furniture and cubicle partitions including electrical diagrams. It also covers forklift operation and safety per regulations mandated by the Occupational Safety and Health Administration (OSHA).
CARPT 140 Interior Systems 1.3 Units
Enrollment Limitation: Must be a registered Carpenter Apprentice.
Hours: 18 hours LEC; 16 hours LAB
This course is a comprehensive study of materials, work processes, and the proper use of tools necessary to install gypsum wallboard and interior metal studs. Topics include green practices used in construction.

CARPT 141 Suspended Framing Ceiling Systems 1.5 Units
Enrollment Limitation: Must be a registered Acoustical Installer Apprentice.
Hours: 24 hours LEC; 12 hours LAB
This course introduces the acoustical apprentice to the installation of suspended framing ceiling systems and situations which require special installation techniques. It also covers industry standards and manufacturers' recommendations for proper installation of engineered ceilings, and proper tool selection and safety.

CARPT 142 Engineered Structural Systems 1 Unit
Enrollment Limitation: Must be a registered Carpenter Apprentice.
Hours: 9 hours LEC; 27 hours LAB
This course covers heavy timber construction in dams, bridges, and trusses. Topics include lamination and the proper disposal and recycling of materials.

CARPT 144 Introduction to Grid Ceiling Installation 1.5 Units
Enrollment Limitation: Must be a registered Acoustical Installer Apprentice.
Hours: 24 hours LEC; 12 hours LAB
This course introduces the Acoustical Apprentice to the installation of grid ceilings. It also covers rolling scaffold and tool safety.

CARPT 145 Specialty Ceiling Systems 1.5 Units
Enrollment Limitation: Must be a registered Acoustical Installer Apprentice.
Hours: 24 hours LEC; 12 hours LAB
This course introduces the Acoustical Apprentice to the installation of special ceiling systems. It also covers aerial lift use and safety.

CARPT 146 Integrated Ceilings and Special Techniques 1.5 Units
Enrollment Limitation: Must be a registered Acoustical Installer Apprentice.
Hours: 24 hours LEC; 12 hours LAB
This course introduces the Acoustical Apprentice to the installation of integrated ceiling systems and situations which require special installation techniques. It also covers industry standards and manufacturers’ recommendations for proper installation of engineered ceiling and proper tool selection and safety.

CARPT 147 Advanced Grid Ceilings 1.5 Units
Enrollment Limitation: Must be a registered Acoustical Installer Apprentice.
Hours: 24 hours LEC; 12 hours LAB
This course introduces the acoustical apprentice to advanced techniques in suspended framing and grid ceiling systems. It also covers industry standards, manufacturers’ recommendations for proper installation of engineered ceilings, and proper tool selection and safety.

CARPT 148 Access Floor Systems 1.5 Units
Enrollment Limitation: Must be a registered Acoustical Installer Apprentice.
Hours: 24 hours LEC; 12 hours LAB
This course is an introduction to the installation of Access Floor Systems. It also covers hand tool ergonomics, safety, and maintenance.

CARPT 150 Concrete - Precast and Prestressed 1 Unit
Enrollment Limitation: Must be a registered Carpenter Apprentice.
Hours: 9 hours LEC; 27 hours LAB
This course covers the use and placement of concrete in residential and commercial construction. Topics include mixing, testing, aggregate, curing, and construction designs, as well as precast and prestressed concrete, materials, forms, molds, handling, lifting devices, and the proper disposal and recycling of materials.

CARPT 151 Commercial Concrete 1.5 Units
Enrollment Limitation: Must be a registered Carpenter Apprentice.
Hours: 23 hours LEC; 12 hours LAB
This course covers concepts and practices of commercial concrete construction. Topics include layout and construction of bolt patterns, concrete columns, and gang forms, as well as the types and methods used to safely build, shore, and place column caps and concrete decks.

CARPT 152 Blueprint Reading-Residential 1.3 Units
Enrollment Limitation: Must be a registered Carpenter Apprentice.
Hours: 18 hours LEC; 16 hours LAB
This course covers residential blueprints. Topics include “green” practices, conventions, lines, symbols, measurements, and specifications used for residential construction.

CARPT 153 Blueprint Reading-Commercial 1.3 Units
Enrollment Limitation: Must be a registered Carpenter Apprentice.
Hours: 18 hours LEC; 16 hours LAB
This course covers commercial and industrial blueprints. Topics include conventions, lines, symbols, measurements, and specifications used for commercial and industrial construction. CalGreen codes are also covered.

CARPT 154 Modular System Blueprint Reading 1 Unit
Enrollment Limitation: Must be a registered carpentry modular systems installer apprentice.
Hours: 13 hours LEC; 23 hours LAB
This course is an introduction to blueprint reading, project specifications, and layout for modular systems. It also covers union trust fund benefits.

CARPT 155 Commercial Concrete 1.5 Units
Enrollment Limitation: Must be a registered Carpenter Apprentice.
Hours: 23 hours LEC; 12 hours LAB
This course covers the use and placement of concrete in residential and commercial construction. Topics include mixing, testing, aggregate, curing, and construction designs, as well as precast and prestressed concrete, materials, forms, molds, handling, lifting devices, and the proper disposal and recycling of materials.

CARPT 156 Roof Framing 1 Unit
Enrollment Limitation: Must be a registered Carpenter Apprentice.
Hours: 9 hours LEC; 27 hours LAB
This course covers roof framing, layout, and construction. Topics include industry terminology, technical information, and construction materials and methods, all which are used in planning and building several types of roofs. Industry standards and codes are also covered.

CARPT 157 Stair Building 1 Unit
Enrollment Limitation: Must be a registered Carpenter Apprentice.
Hours: 9 hours LEC; 27 hours LAB
This course covers types, designs, nomenclature, and Uniform Building Code (UBC) requirements for building stairs. Topics include mathematical calculations and layout procedures for constructing stairs, landings, newels, and handrails.
CARPT 181 Tools of the Trade and Installation of Hardwood Floors 1.5 Units
Enrollment Limitation: Must be a registered Hardwood Floor Layer Apprentice.
Hours: 24 hours LEC; 12 hours LAB
This course introduces Hardwood Floor Layer Apprentices to the installation of hardwood floors per industry standards. It covers tool and equipment identification, safety, and proper maintenance procedures.

CARPT 182 Finishing and Repairing Floors 1.5 Units
Enrollment Limitation: Must be a registered Hardwood Floor Layer Apprentice.
Hours: 24 hours LEC; 12 hours LAB
This course introduces Hardwood Floor Layer Apprentices to the process of finishing and repairing hardwood floors per industry standards. It also covers is installation of athletic and parquet flooring.

CARPT 190 Introduction to Welding and Cutting 1 Unit
Enrollment Limitation: Must be a registered Carpenter Apprentice.
Hours: 9 hours LEC; 27 hours LAB
This course covers welding methods, brazing, and flame cutting. Topics include thermo-forming and thermo-setting plastics applicable to the building construction industry.

CARPT 210 The Acoustical Apprentice, Safety, and the Trade 1.5 Units
Enrollment Limitation: Must be a registered carpentry acoustical apprentice.
Hours: 24 hours LEC; 12 hours LAB
This course introduces the acoustical apprentice to fall protection, tool safety and maintenance, and scaffold safety and maintenance. It also covers Occupational Safety and Health Administration (OSHA) 10, First Aid and CPR certifications.

CARPT 211 Acoustical Installer Safety 1.5 Units
Enrollment Limitation: Must be a registered carpentry acoustical apprentice.
Hours: 24 hours LEC; 12 hours LAB
This course introduces the beginning acoustical apprentice to safe work practices in the use of rolling scaffold systems, lasers, and hand and power tools. It also covers the necessary skills to obtain a welded frame scaffold qualification card from the United Brotherhood of Carpenters (UBC).

CARPT 212 Infection Control Risk Assessment and Hospital Code for Acoustical Installers 1.5 Units
Enrollment Limitation: Must be a registered Acoustical Installer Apprentice.
Hours: 24 hours LEC; 12 hours LAB
This course introduces the acoustical installer apprentice to the safety procedures for hospital work Infection Control Risk Assessment (ICRA). It also covers applicable building codes of acoustical ceiling systems used in hospitals.

CARPT 213 Acoustical Exterior Systems 1.5 Units
Hours: 24 hours LEC; 12 hours LAB
This course introduces the acoustical apprentice to the installation of acoustical exterior systems. It also covers industry standards and manufacturers’ recommendations for proper installation and safety for exterior systems.

CARPT 214 Layout Procedures for Millwrights 1 Unit
Enrollment Limitation: Must be a registered Millwright Apprentice.
Hours: 22 hours LEC; 14 hours LAB
This course introduces the Millwright Apprentice to the precision of advanced and specialty ceiling systems. It also covers hand and power tool safety and aerial lift safety.

CARPT 215 Acoustical Specialty Systems 1.5 Units
Enrollment Limitation: Must be a registered Acoustical Installer Apprentice.
Hours: 24 hours LEC; 12 hours LAB
This course introduces the Acoustical Apprentice to the installation of advanced and specialty ceiling systems. It also covers hand and power tool safety and aerial lift safety.

CARPT 220 Millwright Safety and Tool Skills 1.5 Units
Enrollment Limitation: Must be a registered Millwright Apprentice.
Hours: 24 hours LEC; 12 hours LAB
This course is an introduction to the safety rules and regulations required to work on job sites. It also provides Millwright 16-hour Safety certification.

CARPT 221 The Millwright Apprentice and the Trade 2 Units
Enrollment Limitation: Must be a registered Millwright Apprentice.
Hours: 36 hours LEC
This course informs Millwright apprentices about the structure of their union, as well as their responsibilities and rights. It also covers union history and the development of a proper work ethic.

CARPT 222 Millwright Math Applications and Fall Protection 1.5 Units
Enrollment Limitation: Must be a registered Millwright Apprentice.
Hours: 24 hours LEC; 12 hours LAB
This course reviews math applications needed by Millwright apprentices and introduces the United Brotherhood of Carpenters (UBC) Fall Protection certification.

CARPT 223 Cutting and Welding I 1.5 Units
Enrollment Limitation: Must be a registered Millwright Apprentice.
Hours: 24 hours LEC; 12 hours LAB
This course introduces the safe use of hand and power tools to perform shielded metal arc welding (SMAW), oxy-fuel welding, and plasma cutting. It also covers proper ergonomics.

CARPT 224 Materials of Construction 1.5 Units
Enrollment Limitation: Must be a registered Millwright Apprentice.
Hours: 24 hours LEC; 12 hours LAB
This course introduces, at a basic level, the hardware Millwrights encounter on the job site. It also covers different seals, structural materials, and appropriate application.

CARPT 225 Layout Procedures for Millwrights 1 Unit
Enrollment Limitation: Must be a registered Millwright Apprentice.
Hours: 22 hours LEC; 14 hours LAB
This course introduces the Millwright Carpentry Apprentice to layout procedures using applied blueprint techniques. It also covers the safe use of lift trucks and rough terrain lift practices.

CARPT 226 Precision Optical Instruments 1.5 Units
Enrollment Limitation: Must be a registered Millwright Apprentice.
Hours: 24 hours LEC; 12 hours LAB
This course introduces the Millwright Apprentice to the precision optical instruments currently used by contractors for shaft alignment. It also covers General Electric (GE) turbine familiarization as well as blueprint reading.

CARPT 227 Blueprint Reading and Aerial Lift 1.5 Units
Enrollment Limitation: Must be a registered Millwright Apprentice.
Hours: 24 hours LEC; 12 hours LAB
This course introduces Millwright apprentices to blueprint terminology and interpretation. It also covers the rules and regulations governing the safe use of aerial lifts.
CARPT 228 Millwright Rigging 2 Units
Enrollment Limitation: Must be a registered Millwright Apprentice.
Hours: 35 hours LEC; 5 hours LAB
This course introduces the Millwright Apprentice to rigging. It addresses the safety regulations and practices related to rigging and rigging hardware.

CARPT 229 Cutting and Welding II 1.5 Units
Enrollment Limitation: Must be a registered Millwright apprentice.
Hours: 24 hours LEC; 12 hours LAB
This course expands on CARPT 223 and furthers the Millwright apprentice's knowledge of shielded metal arc welding (SMAW) procedures and welding equipment. It also covers the safe use of welding and cutting with plasma and carbon arc equipment, as well as the American Welding Society (AWS) requirements for welding 2G, 3G, and 4G, horizontal, vertical, and overhead groove joints with SMAW.

CARPT 230 Monorails 1.5 Units
Enrollment Limitation: Must be a registered Millwright Apprentice.
Hours: 24 hours LEC; 12 hours LAB
This course introduces Millwright apprentices to various types of monorails, the materials, safety hazards, and the safe use of hand and power tools on job sites.

CARPT 231 Conveyors for Millwrights 1 Unit
Enrollment Limitation: Must be a registered Millwright Apprentice.
Hours: 16 hours LEC; 20 hours LAB
This course introduces the Millwright Apprentice to various types of conveyor systems including the major components and applications. It covers the methods and components used to install conveyor systems per industry standards.

CARPT 232 Machinery Installation 1.5 Units
Enrollment Limitation: Must be a registered Millwright Apprentice.
Hours: 24 hours LEC; 12 hours LAB
This course introduces the Millwright Apprentice to the proper installation of machinery per industry standards.

CARPT 233 Machinery Maintenance for Millwrights 1.5 Units
Enrollment Limitation: Must be a registered Millwright Apprentice.
Hours: 24 hours LEC; 12 hours LAB
This course covers the basics of millwright machinery maintenance, troubleshooting, and repair.

CARPT 234 Precision Tools for Millwrights 1.5 Units
Enrollment Limitation: Must be a registered Millwright Apprentice.
Hours: 24 hours LEC; 12 hours LAB
This course introduces Millwright Apprentices to precision tools, accurate measurements for layout, leveling practices, and alignment per manufacturer and industry standards.

CARPT 235 Turbines 1.5 Units
Enrollment Limitation: Must be a registered Millwright Apprentice.
Hours: 24 hours LEC; 12 hours LAB
This course introduces Millwright Apprentices to hydro, gas, and steam turbines. It covers proper assembly, installation, and maintenance per manufacturer and industry standards.

CARPT 236 Cutting and Welding III 1.5 Units
Enrollment Limitation: Must be a registered Millwright Apprentice.
Hours: 24 hours LEC; 12 hours LAB
This course expands on CARPT 229 and furthers the Millwright Apprentice’s knowledge of shielded Flux Core Arc Welding (FCAW) procedures and welding equipment. It also covers the safe use of welding and cutting with plasma and carbon arc equipment, as well as the American Welding Society (AWS) requirements for welding 3G and 4G, horizontal, vertical, and overhead groove joints with FCAW.

CARPT 240 Piledriver Safety and Tools 1.5 Units
Enrollment Limitation: Must be a registered Piledriver Apprentice.
Hours: 24 hours LEC; 12 hours LAB
This course introduces Piledriver apprentices to the ergonomics, safety, and maintenance of hand and power tools. It also covers hazard recognition in fall protection.

CARPT 241 Pile Driver Math Applications 2 Units
Enrollment Limitation: Must be a registered Pile Driver Apprentice.
Hours: 36 hours LEC
This course covers mathematical processes in the construction trade with specific focus on the pile driving industry. It also covers personal financial responsibilities.

CARPT 242 Piledriver Rigging 2 Units
Enrollment Limitation: Must be a registered Piledriver Apprentice.
Hours: 35 hours LEC; 5 hours LAB
This course addresses the safety regulations and practices related to rigging and rigging hardware. It exceeds the requirements of OSHA Subpart CC, ANSI A10.42.2000 “Qualified Rigger,” and ANSI B30.

CARPT 243 Form Detailing, Construction, and Erection for Pile Drivers 1.5 Units
Enrollment Limitation: Must be a registered Pile Driver Apprentice.
Hours: 24 hours LEC; 12 hours LAB
This course introduces the Pile Driver Apprentice to planning and building of form work, construction and erection of various concrete forms, and the materials and methods used. It also covers new building materials such as recycled and alternative materials.

CARPT 244 Welding I: Introduction to SMAW 1.5 Units
Enrollment Limitation: Must be a registered Pile Driver Apprentice.
Hours: 24 hours LEC; 12 hours LAB
This course introduces the Pile Driver Apprentice to the safety procedures while performing Shielded Metal Arc Welding (SMAW). It also covers equipment identification and welding consumables.

CARPT 245 Introduction to Land and Water Pile Driving 1.5 Units
Enrollment Limitation: Must be a registered Pile Driver Apprentice.
Hours: 24 hours LEC; 12 hours LAB
This course introduces the Pile Driver Apprentice to pile driving practices on land and in water. Topics covered include safety, pile driving equipment, aerial lifts, cranes, and booms.

CARPT 246 Welding II: SMAW Flat Position and Forklift Certification 1.5 Units
Enrollment Limitation: Must be a registered Piledriver Apprentice.
Hours: 24 hours LEC; 12 hours LAB
This course expands on CARPT 244 and the Piledriver apprentice’s knowledge of the appropriate safety procedures when using shielded metal arc welding (SMAW) and oxy-fuel cutting and the associated components. This course focuses on welding groove joints, flat V-groove (1G), and horizontal V-groove (2G). It also provides certification as a Power Industrial Truck Operator.
CARPT 247 Advanced Land and Water Pile Driving 1 Unit
Enrollment Limitation: Must be a registered Pile Driver Apprentice.
Hours: 18 hours LEC; 18 hours LAB
This course introduces the Pile Driver Apprentice to advanced pile driving practices on land and in water. Topics covered include understanding pile driving equipment, cranes and booms, rigs, accessories, and pile driving hammers.

CARPT 248 Wharfage and Marine Structures 1 Unit
Enrollment Limitation: Must be a registered Pile Driver Apprentice.
Hours: 18 hours LEC; 18 hours LAB
This course introduces the Pile Driver Apprentice to pile driving practices used in bridge erection, and the construction of wharf and marine structures. Topics include various types of lumber and heavy timber, their selection, proper application, natural defects, and basic repair work.

CARPT 249 Welding III: Advanced SMAW 1.5 Units
Enrollment Limitation: Must be a registered Pile Driver Apprentice.
Hours: 24 hours LEC; 12 hours LAB
This course expands on CARPT 246 and the Pile Driver Apprentice's knowledge of the appropriate safety procedures when using Shielded Metal Arc Welding (SMAW) and oxy-fuel cutting and the associated components. This course focuses on welding vertical groove joints (3G). It also covers American Welding Society (AWS) requirements for achieving a welder certification in 3G with SMAW.

CARPT 250 Introduction to Structural Blueprints & Layout Instruments 1.5 Units
Enrollment Limitation: Must be a registered Pile Driver Apprentice.
Hours: 24 hours LEC; 12 hours LAB
This course introduces Piledriver apprentices to structural blueprint reading and layout.

CARPT 251 Advanced Structural Blueprints and Bridge Building 1.5 Units
Enrollment Limitation: Must be a registered Pile Driver Apprentice.
Hours: 24 hours LEC; 12 hours LAB
This course introduces Pile Driver Apprentices to advanced structural blueprint reading and bridge building. Topics include bridge building practices, safety, pre-stressing, post-tensioning, and steel reinforcement of concrete. Basic concrete testing is also covered.

CARPT 252 Falsework, Shoring, and Heavy Timber Framing 1.5 Units
Enrollment Limitation: Must be a registered Pile Driver Apprentice.
Hours: 24 hours LEC; 12 hours LAB
This course introduces Piledriver apprentices to the construction of advanced concrete forms for bridges and shoring with the use of heavy timbers for support, known as falsework. It also covers the various building materials used to create formwork for elaborate decorative architectural designs.

CARPT 253 Advanced Formwork 1.5 Units
Enrollment Limitation: Must be a registered Pile Driver Apprentice.
Hours: 24 hours LEC; 12 hours LAB
This course introduces Piledriver apprentices to the construction of advanced concrete forms used in all types of installations.

CARPT 254 Welding IV: SMAW 4G Certification 1.5 Units
Enrollment Limitation: Must be a registered Piledriver Apprentice.
Hours: 24 hours LEC; 12 hours LAB
This course expands the Piledriver apprentice's knowledge of the appropriate safety procedures when using shielded metal arc welding (SMAW) and oxy-fuel cutting and the associated components. It covers the American Welding Society (AWS) requirements for 4G certification, overhead groove joints with SMAW.

CARPT 255 Welding V: FCAW 3G Certification 1.5 Units
Enrollment Limitation: Must be a registered Piledriver Apprentice.
Hours: 24 hours LEC; 12 hours LAB
This course expands on CARPT 254 and furthers the Piledriver apprentice's knowledge of appropriate safety procedures when using flux core arc welding (FCAW) and oxy-fuel cutting and the associated components. It covers the American Welding Society (AWS) requirements for 3G certification, vertical groove joints with FCAW.

CARPT 256 Welding VI: FCAW 4G Certification 1.5 Units
Enrollment Limitation: Must be a registered Piledriver Apprentice.
Hours: 24 hours LEC; 12 hours LAB
This course expands on CARPT 255 and the Pile Driver Apprentice's knowledge of the appropriate safety procedures when using Flux Core Arc Welding (FCAW) and oxy-fuel cutting and the associated components. This course focuses on welding vertical groove joints (4G). It also covers American Welding Society (AWS) requirements for achieving a welder certification in 4G with FCAW.

CARPT 260 Introduction to Scaffolds and Confined Space 1.5 Units
Enrollment Limitation: Must be a registered Scaffold Erector Apprentice.
Hours: 24 hours LEC; 12 hours LAB
This course introduces Scaffold Erector apprentices to the appropriate safety procedures when using scaffolds and working in a confined space. It also covers the proper use and maintenance of hand tools.

CARPT 261 Welded Frame and Mobile Tower Scaffold 1.5 Units
Enrollment Limitation: Must be a registered Scaffold Erector Apprentice.
Hours: 24 hours LEC; 12 hours LAB
This course introduces the Scaffold Erector apprentice to the industry safety procedures when assembling welded frame and rolling scaffolds.

CARPT 262 System Scaffold 1.5 Units
Enrollment Limitation: Must be a registered Scaffold Erector Apprentice.
Hours: 24 hours LEC; 12 hours LAB
This course introduces the Scaffold Erector apprentice to industry safety procedures when erecting system scaffold, rolling scaffold, and supported scaffold.

CARPT 263 Hazard Awareness for Scaffold Erectors 1.5 Units
Enrollment Limitation: Must be a registered Scaffold Erector Apprentice.
Hours: 26 hours LEC; 10 hours LAB
This course introduces the Scaffold Erector Apprentice to hazards of erecting and dismantling scaffolds. It also covers aerial lift rules and regulations per industry standards.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Units</th>
<th>Enrollment Limitation</th>
<th>Hours: LEC/LAB</th>
</tr>
</thead>
<tbody>
<tr>
<td>CARPT 264</td>
<td>Suspended Scaffolds and Shoring Systems</td>
<td>1</td>
<td>Must be a registered Scaffold Erector Apprentice.</td>
<td>24 hours LEC; 12 hours LAB</td>
</tr>
<tr>
<td>CARPT 265</td>
<td>Tube and Clamp Scaffold</td>
<td>1</td>
<td>Must be a registered Scaffold Erector Apprentice.</td>
<td>24 hours LEC; 12 hours LAB</td>
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<tr>
<td>CARPT 266</td>
<td>Blueprint Reading for Scaffold Erectors</td>
<td>1.5</td>
<td>Must be a registered Scaffold Erector Apprentice.</td>
<td>24 hours LEC; 12 hours LAB</td>
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<tr>
<td>CARPT 268</td>
<td>Welding II</td>
<td>1.5</td>
<td>Must be a registered Scaffold Erector Apprentice.</td>
<td>24 hours LEC; 12 hours LAB</td>
</tr>
<tr>
<td>CARPT 270</td>
<td>Mill Cabinet Safety and Tool Skills</td>
<td>1.5</td>
<td>Must be a registered Mill Cabinet Apprentice.</td>
<td>24 hours LEC; 12 hours LAB</td>
</tr>
<tr>
<td>CARPT 271</td>
<td>The Mill Cabinet Apprentice and the Trade</td>
<td>1.5</td>
<td>Must be a registered Mill Cabinet Apprentice.</td>
<td>24 hours LEC; 12 hours LAB</td>
</tr>
<tr>
<td>CARPT 272</td>
<td>Math for the Trades</td>
<td>2</td>
<td>Must be a registered Mill Cabinet Apprentice.</td>
<td>36 hours LEC</td>
</tr>
<tr>
<td>CARPT 273</td>
<td>Basic Cabinet Making</td>
<td>1.5</td>
<td>Must be a registered Mill Cabinet Apprentice.</td>
<td>24 hours LEC; 12 hours LAB</td>
</tr>
<tr>
<td>CARPT 274</td>
<td>Basic Blueprint Reading for Mill Cabinet</td>
<td>1.5</td>
<td>Must be a registered Mill Cabinet Apprentice.</td>
<td>24 hours LEC; 12 hours LAB</td>
</tr>
<tr>
<td>CARPT 275</td>
<td>Machinery Maintenance for Mill Cabinet</td>
<td>1.5</td>
<td>Must be a registered Mill Cabinet Apprentice.</td>
<td>24 hours LEC; 12 hours LAB</td>
</tr>
<tr>
<td>CARPT 276</td>
<td>Cabinet Hardware Installation</td>
<td>1.5</td>
<td>Must be a registered Mill Cabinet Apprentice.</td>
<td>24 hours LEC; 12 hours LAB</td>
</tr>
<tr>
<td>CARPT 277</td>
<td>Sanding, Stains, and Finish Preparation</td>
<td>1.5</td>
<td>Must be a registered Mill Cabinet Apprentice.</td>
<td>24 hours LEC; 12 hours LAB</td>
</tr>
<tr>
<td>CARPT 278</td>
<td>Advanced Machinery Operation</td>
<td>1.5</td>
<td>Must be a registered Mill Cabinet Apprentice.</td>
<td>24 hours LEC; 12 hours LAB</td>
</tr>
<tr>
<td>CARPT 279</td>
<td>Advanced Blueprint Reading for Mill Cabinet</td>
<td>1.5</td>
<td>Must be a registered Mill Cabinet Apprentice.</td>
<td>24 hours LEC; 12 hours LAB</td>
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<tr>
<td>CARPT 280</td>
<td>Advanced Cabinet Making</td>
<td>1.5</td>
<td>Must be a registered Mill Cabinet Apprentice.</td>
<td>24 hours LEC; 12 hours LAB</td>
</tr>
<tr>
<td>CARPT 281</td>
<td>Veneers, Laminate, and Finishing</td>
<td>1.5</td>
<td>Must be a registered Mill Cabinet Apprentice.</td>
<td>24 hours LEC; 12 hours LAB</td>
</tr>
<tr>
<td>CARPT 282</td>
<td>CAD Basics for Mill Cabinetry</td>
<td>1.5</td>
<td>Must be a registered Mill Cabinet Apprentice.</td>
<td>24 hours LEC; 12 hours LAB</td>
</tr>
<tr>
<td>CARPT 283</td>
<td>Introduction to CNC</td>
<td>1.5</td>
<td>Must be a registered Mill Cabinet Apprentice.</td>
<td>24 hours LEC; 12 hours LAB</td>
</tr>
</tbody>
</table>
**APPRENTICESHIP**

**DRLTH 100 Introduction to the Trade** 2 Units  
Enrollment Limitation: Registered Drywall/Lathing Apprentice  
Hours: 36 hours LEC  
This course is an introduction to drywall/lathing apprenticeship, state and federal apprenticeship laws, apprenticeship record keeping, apprenticeship evaluation procedures, general safety, work ethic, sexual harassment issues, and basic tools of the trade.

**DRLTH 102 Basic Applications** 1.5 Units  
Enrollment Limitation: Registered Drywall/Lathing Apprentice  
Hours: 21 hours LEC; 18 hours LAB  
This course is an introduction to basic gypsum wall covering and ceiling applications. It also includes taping installations, knot recognition, and application to rigging on construction job sites.

**DRLTH 103 Drywall Lathing Trade Safety** 1.5 Units  
Enrollment Limitation: Registered Drywall/Lathing Apprentice  
Hours: 24 hours LEC; 12 hours LAB  
This course covers trade safety for drywall lathing apprentices including hospital safety, rough terrain lift truck operation, and first aid and CPR.

**DRLTH 105 Mathematics for Drywall/Lathers** 2 Units  
Enrollment Limitation: Registered Drywall/Lathing Apprentice  
Hours: 36 hours LEC  
This course covers mathematical applications for the drywall and lathing trades. Topics include whole numbers, fractions, decimals, ratios, proportions, percentages, angles and degrees, areas, and volumes.

**DRLTH 110 Residential Metal Framing** 1.5 Units  
Enrollment Limitation: Registered Drywall/Lathing Apprentice  
Hours: 18 hours LEC; 27 hours LAB  
This course covers basic residential metal framing. It includes framing of floors, walls, doors, windows, roofs, trusses, and stairs.

**DRLTH 112 Doors, Windows, Exterior Systems/Building Documents** 1.5 Units  
Enrollment Limitation: Registered Drywall/Lathing Apprentice  
Hours: 21 hours LEC; 18 hours LAB  
This course covers the hardware, installation, and framing of doors and windows and exterior wall covering systems. It also covers blueprints and building codes.

**DRLTH 120 Blueprint Reading I** 1.5 Units  
Enrollment Limitation: Registered Drywall/Lathing Apprentice  
Hours: 21 hours LEC; 18 hours LAB  
This course covers job specifications, blueprint structure, and basic blueprint reading and interpretation. It also covers construction drawings and sketching.

**DRLTH 121 Blueprint Reading II** 1.5 Units  
Enrollment Limitation: Registered Drywall/Lathing Apprentice  
Hours: 21 hours LEC; 18 hours LAB  
This course is a continuation of DRLTH 120. Topics include interpretation, problem solving, correlating specifications, prints, addenda, notes, sections, and mathematics used with blueprints.

**DRLTH 122 Blueprint Reading III** 1.5 Units  
Enrollment Limitation: Registered Drywall/Lathing Apprentice  
Hours: 21 hours LEC; 18 hours LAB  
This course is a continuation of DRLTH 121. Topics include take-offs, material estimates, material requisition, job costs, and layout from blueprints.

**DRLTH 130 Welding I** 1.5 Units  
Enrollment Limitation: Registered Drywall/Lathing Apprentice  
Hours: 21 hours LEC; 18 hours LAB  
This course covers welding and welding concepts for construction job sites. Topics include welding safety, basic welding terms, definitions, positions, and cutting operations.

**DRLTH 131 Welding II** 1.5 Units  
Enrollment Limitation: Registered Drywall/Lathing Apprentice  
Hours: 21 hours LEC; 18 hours LAB  
This course is a continuation of DRLTH 130. Topics include safety, concepts, processes, symbols, and certification performance of welding.

**DRLTH 140 Exterior/Advanced Fire Control System and Partitions** 1.5 Units  
Enrollment Limitation: Registered Drywall/Lathing Apprentice  
Hours: 21 hours LEC; 18 hours LAB  
This course covers safety, principles, theory, and application of advanced fire control systems. Topics include principles and applications of partitions and metal framing.

**DRLTH 142 Exterior Systems and Trims** 1.5 Units  
Enrollment Limitation: Registered Drywall/Lathing Apprentice  
Hours: 21 hours LEC; 18 hours LAB  
This course covers safety, principles, and application of exterior wall framing, coverings, and trims.

**DRLTH 150 Interior Metal Lathing System, Sound Control** 1.5 Units  
Enrollment Limitation: Registered Drywall/Lathing Apprentice  
Hours: 21 hours LEC; 18 hours LAB  
This course covers materials, principles, theory, and application of lath and plaster interior hollow walls and partitions. Topics include principles and application of sound control systems, an introduction to mathematics, and layout for building arches.
DRLTH 160  Ceilings, Shaft Protection and Demountable Partitions  1.5 Units
Enrollment Limitation: Registered Drywall/Lathing Apprentice
Hours: 21 hours LEC; 18 hours LAB
This course covers safety, materials, principles, theory, and installation of ceiling systems, demountable partitions, and shaft systems.

DRLTH 162  Arches, Furring and Advanced Systems  1.5 Units
Enrollment Limitation: Registered Drywall/Lathing Apprentice
Hours: 21 hours LEC; 18 hours LAB
This course covers safety, materials, principles, theory, and installation of furring, arch systems, and fire retardant materials.

DRLTH 170  Advanced Construction Techniques  1.5 Units
Enrollment Limitation: Registered Drywall/Lathing Apprentice
Hours: 21 hours LEC; 18 hours LAB
This course covers safety, materials, principles, and theory of advanced construction techniques. Topics also include following written and verbal directions, construction directly from blueprints, and research techniques.

DRLTH 298  Work Experience Drywall/Lathing Apprenticeship  1-4 Units
Enrollment Limitation: Indentured in the drywall/lathing apprenticeship program.
Hours: 60-300 hours LAB
This course provides students the opportunity to work in the drywall/lathing apprenticeship program for the purpose of developing specific skills to meet the goals and objectives of the drywall/lathing Joint Apprenticeship and Training Committee (J.A.T.C.). Students complete work experience hours at approved training sites. Students may take up to 16 units total across all Work Experience course offerings. This course may be repeated when there are new or expanded learning objectives. Only one Work Experience course may be taken per semester.

ELECT 110  Electrical Apprenticeship I  5 Units
Enrollment Limitation: Registered Electrical Apprentice
Hours: 54 hours LEC; 108 hours LAB
This course is an introduction to electrical apprenticeship, electrical shop practices, basic electrical layout, tools of the trade, and construction materials. Topics include working with electrical related mathematics and basic electrical formulas.

ELECT 111  Electrical Apprenticeship II  3 Units
Enrollment Limitation: Registered Electrical Apprentice
Hours: 36 hours LEC; 70 hours LAB
This course covers DC theory, DC series and parallel circuits, DC combination circuits, principles of electromagnetism, and power generation. Topics include an introduction to the National Electrical Code (NEC) and basic blueprint reading.

ELECT 120  Electrical Apprenticeship III  3 Units
Enrollment Limitation: Registered Electrical Apprentice
Hours: 36 hours LEC; 70 hours LAB
This course covers AC theory, AC generation, use of instruments, and phase and circuit calculations. Topics include codeology and how it applies to the National Electrical Code (NEC).

ELECT 121  Electrical Apprenticeship IV  3 Units
Enrollment Limitation: Registered Electrical Apprentice
Hours: 36 hours LEC; 70 hours LAB
This course covers AC theory in series, parallel, and combination resistive-inductive (RL), resistive-capacitive (RC), inductive-capacitive (LC), and resistive-inductive-capacitive (RLC) circuits. Topics include conduit bending using a ratcheting and mechanical bender, transformer construction and installation, and applications of the National Electrical Code (NEC).

ELECT 130  Electrical Apprenticeship V  3 Units
Enrollment Limitation: Registered Electrical Apprentice
Hours: 36 hours LEC; 70 hours LAB
This course covers electrical safety-related work practices specified by the National Fire Protection Agency publication 70E (NFPA 70E). It covers industrial blueprint reading, conduit bending using electro-hydraulic benders, and introductions to motor control and semiconductors. Additional topics include applying the National Electrical Code (NEC) with emphasis on grounding and bonding.

ELECT 131  Electrical Apprenticeship VI  3.3 Units
Enrollment Limitation: Registered Electrical Apprentice
Hours: 36 hours LEC; 70 hours LAB
This course covers advanced grounding topics, transformer operation and theory, and advanced industrial blueprint reading. Topics include applying the National Electrical Code (NEC) and emphasis of overcurrent protection, transformers and ground fault protection.

ELECT 140  Electrical Apprenticeship VII  3.3 Units
Enrollment Limitation: Registered Electrical Apprentice
Hours: 36 hours LEC; 70 hours LAB
This course covers lightning protection systems, AC and DC motors, motor control systems. Topics include advanced blueprints and electrical room layout, as well as building take-offs.

ELECT 141  Electrical Apprenticeship VIII  3 Units
Enrollment Limitation: Registered Electrical Apprentice
Hours: 36 hours LEC; 70 hours LAB
This course covers AC motor speed controls, National Electrical Manufacturing Association (NEMA) standards, motor control troubleshooting, digital electronics, and programmable logic controllers (PLCs). Topics include use of the National Electrical Code (NEC) with cable trays, electric welders, phase converters, hazardous locations, and special occupations.

ELECT 150  Electrical Apprenticeship IX  3 Units
Enrollment Limitation: Registered Electrical Apprentice
Hours: 36 hours LEC; 70 hours LAB
This course covers fire alarms, security, power quality, stewardship training, and photo-voltaic systems. It also includes preparation for the California Electrician Certification examination.

ELECT 151  Electrical Apprenticeship X  3 Units
Enrollment Limitation: Registered Electrical Apprentice
Hours: 36 hours LEC; 70 hours LAB
This course covers building automation, structured cabling systems, and an introduction to instrumentation used on industrial process controls. It also covers advanced programmable logic controllers (PLCs) used in motor control circuits.
ELECT 281 Green Technology
High Efficiency Lighting 2 Units
Enrollment Limitation: Must be a current California State Certified General Electrician.
Hours: 27 hours LEC; 27 hours LAB
This course covers installing, troubleshooting, commissioning and maintaining advanced lighting controls, switching controls, dimming controls, occupancy sensors, photo-sensors and controllers, distribution relay systems, remote controlled circuit breakers, and wireless systems. Pass/No Pass only.

ELECT 298 Work Experience in Electricians Apprenticeship 1-4 Units
Enrollment Limitation: Indentured in the electricians apprenticeship program. General Education: AA/AS Area III(6)
Hours: 60-300 hours LAB
This course provides the opportunity to work in the electricians apprenticeship program for the purpose of developing specific skills to meet the goals and objectives of the electricians Joint Apprenticeship and Training Committee (J.A.T.C.). Students complete work experience hours at approved training sites. Students may take up to 16 units total across all Work Experience course offerings. This course may be repeated when there are new or expanded learning objectives. Only one Work Experience course may be taken per semester.

Electrical Residential Apprenticeship
Electrician Trainee

ELTRN 110 Electrician Trainee I 4 Units
Advisory: MATH 100, 104, or 132 with a grade of “C” or better
Hours: 63 hours LEC; 27 hours LAB
This course is an introduction to the Commercial/Residential Electrician Trainee Program. It includes safety procedures, Occupational Safety and Health Administration (OSHA) requirements, Environmental Protection Agency (EPA) requirements, basic rigging, basic electrical mathematics, Ohm’s Law, Direct Current (DC) theory, and construction related CPR and First Aid. This course meets the State of California requirement to obtain an electrician trainee license. This course was previously known as ELECT 210.

ELTRN 111 Electrician Trainee II 4 Units
Prerequisite: ELTRN 110 with a grade of “C” or better
Hours: 63 hours LEC; 27 hours LAB
This course covers Alternating Current (AC) theory, including AC and Direct Current (DC) generation, phase, and circuit mathematical calculations. It also covers the use of meters in different applications of alternating current, and provides a basic introduction to electronics and application of the National Electrical Code (NEC) to jobsite electrical installations. This course meets the State of California requirement to obtain an electrician trainee license. This course was formerly known as ELECT 211.

ELTRN 120 Electrician Trainee III 4 Units
Prerequisite: ELTRN 110 and 111 with grades of “C” or better
Hours: 63 hours LEC; 27 hours LAB
This is the third course of the Commercial/Residential Electrician Trainee Program. Topics include conductors, cables, conduits, lighting systems, panelboard, switchboard, and overcurrent devices for residential and commercial installations. This course also covers reading blueprint drawings, making sketches, drawing architectural views, and identifying common blueprint scales and electrical symbols. This course was formerly known as ELECT 220.

ELTRN 121 Electrician Trainee IV 4 Units
Prerequisite: ELTRN 110 and 111 with grades of “C” or better
Hours: 63 hours LEC; 27 hours LAB
This is the fourth course required for the Commercial/Residential Electrician Trainee Program. Topics include electrical grounding systems and lightning protection systems. It also includes job site personnel development and job site management. This course was formerly known as ELECT 221.

ELTRN 130 Electrician Trainee V 4 Units
Prerequisite: ELTRN 110 and 111 with grades of “C” or better
Hours: 63 hours LEC; 27 hours LAB
This is the fifth course required for the Commercial/Residential Electrician Trainee Program. Topics include fundamentals of motors, motor controllers, process controllers, generators, and transformers. Topics also include testing of cables, generators, and motors. This course meets the State of California requirement to obtain an electrician trainee license. This course was formerly known as ELECT 230.

ELTRN 131 Electrician Trainee VI 4 Units
Prerequisite: ELTRN 110 and 111 with grades of “C” or better
Hours: 63 hours LEC; 27 hours LAB
This is the sixth course required for the Commercial/Residential Electrician Trainee Program. Topics include fire alarm systems, burglar alarm systems, and information transport systems (ITS). This course also covers basic electrical requirements for heating, air conditioning, and refrigeration systems. It meets the State of California requirement to obtain an electrician trainee license. This course was formerly known as ELECT 231.

ELTRN 180 Electrical Workers State Certification Preparation 4.5 Units
Advisory: Completion of ELTRN 110 and 111.
Hours: 81 hours LEC
This is a preparatory course for the Electricians’ State Licensing Certification for California. It reviews basic electrical formulas and provides an in-depth review of the National Electrical Code (NEC) and safety. This course was formerly known as ELECT 280.

Ironworker Apprenticeship

IW 100 Orientation and History of the Trade 1.5 Units
Enrollment Limitation: Registered Ironworkers Apprentice
Hours: 18 hours LEC; 27 hours LAB
This course introduces the responsibilities of an Ironworker’s Apprentice. It includes the Ironworker’s rules and regulations, record keeping, evaluations and advancement, work ethic, sexual harassment issues, and basic tools. It acquaints the Ironworker Apprentice with specifications that constitute a safe working environment under the Occupational Safety and Health Administration (OSHA); including an introduction to the rights and obligations that OSHA imposes. In addition, this course provides an orientation and overview of the history of the Ironworker trade.

IW 101 OSHA 30 for Ironworkers 1.5 Units
Enrollment Limitation: Must be a state registered ironworker apprentice.
Hours: 25 hours LEC; 15 hours LAB
This course provides the ironworker apprentice safety standards and regulations for construction project sites as required by the Occupational Safety and Health Administration (OSHA). Topics include general safety and health provisions, OSHA citation policies, fire protection and prevention, fall protection, personal protection equipment (PPE), safe handling and storage of materials, steel erection, and lifesaving practices and equipment.
IW 110  Mixed Base  1.5 Units
Enrollment Limitation: Registered Ironworkers Apprentice
Hours: 18 hours LEC; 27 hours LAB
This course provides an overview of the type of construction blueprints commonly used with emphasis on function and interpretation. It offers a brief review of basic math skills and provides an opportunity to apply these skills in solving typical problems relevant to the Ironworker trade.

IW 120  Rigging  1.5 Units
Enrollment Limitation: Registered Ironworkers Apprentice
Hours: 18 hours LEC; 27 hours LAB
This course introduces rigging applications such as wire rope, chains, slings, cranes, hoists, and scaffolds. It also includes rigging safety, knot recognition and strength identification, and knot applications within rigging.

IW 130  Reinforcing I  1.5 Units
Enrollment Limitation: Registered Ironworkers Apprentice
Hours: 18 hours LEC; 27 hours LAB
This course introduces standard codes, code classifications, plans, schedules, charts, and specifications commonly used by Ironworkers. Topics include construction techniques used in reinforcing concrete members with steel, use of bar supports, placement of reinforcing iron, and general principles of bar splicing and welding. Post-tensioning and pre-stressing techniques are also introduced.

IW 131  Reinforcing II/Post Tensioning  1.5 Units
Prerequisite: IW 130 with a grade of “C” or better
Enrollment Limitation: Registered Ironworkers Apprentice
Hours: 18 hours LEC; 27 hours LAB
This course expands the interpretation of standard codes, code classifications, plans, schedules, charts, and specifications commonly used in the Ironworker trade. Construction techniques, use of bar supports, placement of reinforcing iron, general principles of bar splicing and welding are presented in depth.

IW 140  Precast Concrete and Metal Buildings  1.5 Units
Enrollment Limitation: Registered Ironworkers Apprentice
Hours: 18 hours LEC; 27 hours LAB
This course covers the erection of precast concrete and metal buildings. Topics include rigging, handling, and installing of structures in a safe and economical manner. It also covers reading and interpreting charts, tables, and blueprints.

IW 150  Welding I  1.5 Units
Enrollment Limitation: Registered Ironworkers Apprentice
Hours: 18 hours LEC; 27 hours LAB
This course introduces the structure of ferrous metals and their reaction to heat. It covers the equipment and materials used for shielded metal-arc welding including safety hazards, charts, key terms, electrodes, and welding current controls.

IW 151  Welding II  1.5 Units
Prerequisite: IW 150 with a grade of “C” or better
Enrollment Limitation: Registered Ironworkers Apprentice
Hours: 18 hours LEC; 27 hours LAB
This course continues the study of ferrous metals and their reactions to heat. Equipment and materials employed in the use of shielded metal-arc and gas shielded-arc are included in this course.

IW 152  Welding III  1.5 Units
Prerequisite: IW 151 with a grade of “C” or better
Enrollment Limitation: Registered Ironworkers Apprentice
Hours: 18 hours LEC; 27 hours LAB
This course focuses on skill development in shielded metal arc and flux core arc welding on ferrous and non-ferrous metals. Vertical and overhead positions on all types of joints as they relate to structural stability are also covered.

IW 160  Lead Hazard  1.5 Units
Enrollment Limitation: Registered Ironworkers Apprentice
Hours: 18 hours LEC; 27 hours LAB
This course describes the health effects caused by lead exposure. Topics include the Occupational Safety and Health Administration (OSHA) regulations, sampling methods, legal rights of workers, and the use of proper protective equipment and work methods.

IW 170  Structural I  1.5 Units
Enrollment Limitation: Registered Ironworkers Apprentice
Hours: 18 hours LEC; 27 hours LAB
This course covers the theory and practice of blueprint reading, structural erection procedures, and proper steel structure construction.

IW 171  Structural II  1.5 Units
Prerequisite: IW 170 with a grade of “C” or better
Hours: 18 hours LEC; 27 hours LAB
This course addresses the theory and practice of blueprint reading related to structure construction. Structural erection procedures including the operation of mobile and tower cranes and proper construction of various steel structures are presented.

IW 180  Architectural/Ornamental I  1.5 Units
Enrollment Limitation: Registered Ironworkers Apprentice
Hours: 18 hours LEC; 27 hours LAB
This course covers the procedures and practices employed by the Ironworker in architectural and ornamental iron-working. Topics include tools, anchors, fasteners, and various layout instruments. Additionally, constructing curtain wall systems, applying sealants, and glazing systems are covered.

IW 183  The History of Ironworkers  2.5 Units
Enrollment Limitation: Registered Ironworkers Apprentice
Hours: 45 hours LEC
This course covers the history of iron-working and the Ironworker Union movement from its birth in 1896 to the present.

IW 186  Architectural/Ornamental II  1.5 Units
Prerequisite: IW 180 with a grade of “C” or better
Enrollment Limitation: Registered Ironworkers Apprentice
Hours: 18 hours LEC; 27 hours LAB
This course is a continuation of IW 180 and provides detailed information on knowledge, procedures, and practices employed by the ironworker in architectural and ornamental iron working. Topics include tools, anchors, fasteners, and various layout instruments. Additionally, constructing curtain wall systems, applying sealants, and glazing systems are covered. This course is not open to students who have taken IW 181.

IW 298  Work Experience in Ironworkers Apprenticeship  1-4 Units
Enrollment Limitation: Indentured in the ironworkers apprenticeship program.
General Education: AA/AS Area III(b)
Hours: 60-300 hours LAB
This course provides students the opportunity to work in the ironworkers apprenticeship program for the purpose of developing specific skills to meet the goals and objectives of the ironworkers Joint Apprenticeship and Training Committee (J.A.T.C.). Students complete work experience hours at approved training sites. Students may take up to 16 units total across all Work Experience course offerings. This course may be repeated when there are new or expanded learning objectives. Only one Work Experience course may be taken per semester.
### Operating Engineers

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
<th>Enrollment Limitation: Registered Operating Engineer Apprentice</th>
</tr>
</thead>
<tbody>
<tr>
<td>OE3 101</td>
<td>Introduction to Operators</td>
<td>8</td>
<td>This course introduces the skills and knowledge required to be a Construction Equipment Operator in the Operating Engineers Apprenticeship. Topics include an introduction to grade checking and the operation of a compactor, dozer, scraper, and backhoe.</td>
</tr>
<tr>
<td>OE3 102</td>
<td>Introduction to Heavy Duty Repair</td>
<td>8</td>
<td>This course is an introduction to the Heavy Equipment Operator in the Operating Engineers Apprenticeship. Topics include an introduction to electrical, pneumatic, hydraulic, and power train systems for heavy duty construction equipment. Additional topics include engines and safety.</td>
</tr>
<tr>
<td>OE3 103</td>
<td>Introduction to Crane Operators</td>
<td>12</td>
<td>This course introduces the skills and knowledge to be a Crane Operator in the Operating Engineers Apprenticeship. Topics include rigging, crane operations, lubrication, booms, loading, and safety regulations.</td>
</tr>
<tr>
<td>OE3 104</td>
<td>Introduction to Grade Setter</td>
<td>8</td>
<td>This course introduces the skills and knowledge to be a Grade Setter in the Operating Engineers Apprenticeship. Topics include an introduction to grade checking and the operations of compactors, bulldozers, scrapers, and loaders.</td>
</tr>
<tr>
<td>OE3 110</td>
<td>Introduction to Dredge Operation</td>
<td>3</td>
<td>This course introduces dredge operations. Topics include principles of dredging, water safety, knot tying, hand signals, and crane operations for dredging operations.</td>
</tr>
<tr>
<td>OE3 112</td>
<td>Seamanship I</td>
<td>3</td>
<td>This course covers seamanship as it is required for dredge operations. Topics include boat handling, use of nautical charts, piloting, signaling, buoy safety, and general water safety requirements for dredge operations.</td>
</tr>
<tr>
<td>OE3 115</td>
<td>Seamanship II</td>
<td>3</td>
<td>Prerequisite: OE3 112 with a grade of “C” or better. This course is a continuation of OE3 112. Advanced topics include marine rescue, lifeboat seamanship, dredging material handling, shipboard fire suppression, and shore operations.</td>
</tr>
<tr>
<td>OE3 120</td>
<td>Plant Operations</td>
<td>3</td>
<td>This course covers the operation, maintenance, and troubleshooting of batch, crushing, screening, and washing plants in the construction industry. Topics include maintenance procedures, erecting and dismantling, and types of materials.</td>
</tr>
<tr>
<td>OE3 121</td>
<td>Welding and Cutting</td>
<td>3</td>
<td>Enrollment Limitation: Registered Operating Engineer Apprentice Hours: 41 hours LEC, 39 hours LAB This course covers welding and oxyacetylene used in batch, crushing, screening, and washing application plants. Topics include shop safety practices, proper selection of welding equipment, use of oxyacetylene equipment, and proper welding techniques.</td>
</tr>
<tr>
<td>OE3 130</td>
<td>Backhoe &amp; Excavator Operations</td>
<td>3</td>
<td>Enrollment Limitation: Registered Operating Engineer Apprentice Hours: 41 hours LEC, 39 hours LAB This course covers the safe operation of a backhoe and/or excavator. Topics include trenching safety, hazards of underground construction, sloping, grade checking, and excavation for a manhole.</td>
</tr>
<tr>
<td>OE3 131</td>
<td>Grade Checking</td>
<td>3</td>
<td>Enrollment Limitation: Registered Operating Engineer Apprentice Hours: 41 hours LEC, 39 hours LAB This course covers grade checking for the construction equipment operator. Topics include grade setting terminology, stake marking, laser levelers, street section grading, Global Positioning System (GPS) devices, plan reading, metric conversions, and locating underground infrastructure.</td>
</tr>
<tr>
<td>OE3 132</td>
<td>Scrapers</td>
<td>3</td>
<td>Enrollment Limitation: Registered Operating Engineer Apprentice Hours: 41 hours LEC, 39 hours LAB This course covers the operation of a scraper. Topics include equipment safety, grading, dumping and spreading, grade checking, and operation with a scraper.</td>
</tr>
<tr>
<td>OE3 133</td>
<td>Loaders</td>
<td>3</td>
<td>Enrollment Limitation: Registered Operating Engineer Apprentice Hours: 41 hours LEC, 39 hours LAB This course covers the safe operation of a loader. Topics include equipment safety, loading, transporting, stockpiling, and hand signals.</td>
</tr>
<tr>
<td>OE3 134</td>
<td>Motor Grader</td>
<td>3</td>
<td>Enrollment Limitation: Registered Operating Engineer Apprentice Hours: 41 hours LEC, 39 hours LAB This course covers the operation of a motor grader. Topics include equipment safety, grading, mixing, compaction density, grade checking, and v-ditching.</td>
</tr>
<tr>
<td>OE3 135</td>
<td>Dozers</td>
<td>3</td>
<td>Enrollment Limitation: Registered Operating Engineer Apprentice Hours: 41 hours LEC, 39 hours LAB This course covers the operation of dozers. Topics include equipment safety, cutting, spreading, and grade checking.</td>
</tr>
<tr>
<td>OE3 136</td>
<td>Directional Drilling</td>
<td>3</td>
<td>Enrollment Limitation: Registered Operating Engineer Apprentice Hours: 41 hours LEC, 39 hours LAB This course covers the operation, maintenance, and troubleshooting of directional boring machines. Topics include safety, tracker control, maintenance, and drilling fluids.</td>
</tr>
<tr>
<td>OE3 140</td>
<td>Boom Pumps</td>
<td>3</td>
<td>Enrollment Limitation: Registered Operating Engineer Apprentice Hours: 41 hours LEC, 39 hours LAB This course introduces boom pumps, such as those for overhead concrete pumping. Topics include safety, maintenance, components, controls, hand signals, and blockages.</td>
</tr>
</tbody>
</table>
OE3 141   Line Pumps   3 Units
Enrollment Limitation: Registered Operating Engineer Apprentice.
Hours: 41 hours LEC; 39 hours LAB
This course introduces line pumps, such as those for ground concrete pumping. Topics include safety, maintenance, components, controls, hand signals, and blockages.

OE3 142   Advanced Boom Pumps   3 Units
Prerequisite: OE3 140 with a grade of “C” or better
Enrollment Limitation: Registered Operating Engineer Apprentice.
Hours: 41 hours LEC; 39 hours LAB
This course covers advanced boom pumps such as those used for overhead concrete pumping. Topics include advanced safety, preventative maintenance, components, controls, hand signals, blockages, and troubleshooting procedures.

OE3 143   Advanced Line Pumps   3 Units
Prerequisite: OE3 141 with a grade of “C” or better
Enrollment Limitation: Registered Operating Engineer Apprentice.
Hours: 41 hours LEC; 39 hours LAB
This course covers advanced line pumps, such as those used for ground concrete pumping. Topics include advanced safety, preventative maintenance, components, controls, hand signals, blockages, and troubleshooting procedures.

OE3 160   Grade Setting I   3 Units
Enrollment Limitation: Registered Operating Engineer Apprentice
Hours: 41 hours LEC; 39 hours LAB
This course introduces the skills and knowledge required to be a grade setter in the Operating Engineer Apprenticeship. Topics include surveying principles, plan reading, global positioning systems (GPS), cut/fill slope staking, street section grading, and pad layout.

OE3 161   Grade Setting II   3 Units
Prerequisite: OE3 160 with a grade of “C” or better
Enrollment Limitation: Registered Operating Engineer Apprentice
Hours: 41 hours LEC; 39 hours LAB
This course covers the advanced skills and knowledge required to be a grade setter in the Operating Engineer Apprenticeship. Topics include surveying principles, plan reading, global positioning systems (GPS), cut/fill slope staking, street section grading, and pad layout.

OE3 182   Heavy Duty Equipment Hydraulics   3 Units
Enrollment Limitation: Registered Operating Engineer Apprentice
Hours: 41 hours LEC; 39 hours LAB
This course covers hydraulic systems of heavy duty equipment. Topics include pumps, actuators, hoses, schematic drawings, and similar systems.

OE3 183   Engines   3 Units
Enrollment Limitation: Registered Operating Engineer Apprentice.
Hours: 41 hours LEC; 39 hours LAB
This course covers the principles, operation, and diagnosis of heavy duty engines commonly used in construction equipment, such as earth moving equipment. Topics include fuel systems, specialty tool usage, and troubleshooting techniques.

OE3 184   Power Trains   3 Units
Enrollment Limitation: Registered Operating Engineer Apprentice.
Hours: 41 hours LEC; 39 hours LAB
This covers the principles, operation, and diagnosis of heavy duty power trains commonly used in construction equipment such as earth moving equipment. Topics include shop safety, transmissions, drive-lines, differentials, and troubleshooting techniques.

OE3 185   Equipment Welding   3 Units
Enrollment Limitation: Registered Operating Engineer Apprentice.
Hours: 41 hours LEC; 39 hours LAB
This course covers welding and oxyacetylene processes used in heavy construction equipment, such as bulldozers, backhoes, or earth moving equipment. Topics include shop safety practices, proper selection of welding equipment, use of oxyacetylene equipment, and proper welding techniques.

OE3 186   Lubrication Preventative Maintenance   3 Units
Enrollment Limitation: Registered Operating Engineer Apprentice.
Hours: 41 hours LEC; 39 hours LAB
This course covers lubrication preventative maintenance for the construction lube technician. Topics include lubricants, air filters, engine oils, and manufacturer services on heavy construction equipment.

OE3 187   Oils, Lubricants, and Coolants   3 Units
Enrollment Limitation: Registered Operating Engineer Apprentice.
Hours: 41 hours LEC; 39 hours LAB
This course covers oils, lubricants, and coolants for the construction lube technician. Topics include lubricants, engine oils, gear oils, transmission oils, grease, and coolants.

OE3 188   Servicing and Inspections   3 Units
Enrollment Limitation: Registered Operating Engineer Apprentice.
Hours: 41 hours LEC; 39 hours LAB
This course covers servicing and inspection skills for the construction lube technician. Topics include minor repairs, performing services, and inspecting for prevention.

OE3 298   Work Experience in Operating Engineers Apprenticeship   1-4 Units
Enrollment Limitation: Indentured in the operating engineers apprenticeship program.
General Education: AA/AS Area III(b)
Hours: 60-300 hours LAB
This course provides students the opportunity to work in the operating engineers apprenticeship program for the purpose of developing specific skills to meet the goals and objectives of the operating engineers Joint Apprenticeship and Training Committee (J.A.T.C.). Students complete work experience hours at approved training sites. Students may take up to 16 units total across all Work Experience course offerings. This course may be repeated when there are new or expanded learning objectives. Only one Work Experience course may be taken per semester.

Plumbers and Pipefitters Apprenticeship

PLUMB 100   Introduction to the Trade   4.5 Units
Enrollment Limitation: Must be a registered Plumber and Pipefitter Apprentice.
Hours: 69 hours LEC; 39 hours LAB
This course introduces the Plumber and Pipefitter Apprentice to the history of the trade and the role and responsibilities of an apprentice. It also covers tool and equipment safety and rigging.

PLUMB 101   Introduction to the Refrigeration Fitter Apprenticeship   4.5 Units
Enrollment Limitation: Must be a registered Plumber and Pipefitter Apprentice.
Hours: 69 hours LEC; 39 hours LAB
This course introduces the Plumber and Pipefitter specializing in Refrigeration Fitter to the history of the trade and the role and responsibilities of an apprentice. It also covers tool and equipment safety and applied mathematics.
PLUMB 110  Plumbing Science, Fixtures, and Rigging  4 Units
Enrollment Limitation: Must be a registered Plumber and Pipefitter Apprentice.
Hours: 62 hours LEC; 46 hours LAB
This course introduces the Plumber and Pipefitter Apprentice to plumbing science and mechanics. It also covers various plumbing fixtures and rigging operations.

PLUMB 120  Gas Welding and Brazing  2 Units
Enrollment Limitation: Must be a registered Plumber and Pipefitter Apprentice.
Hours: 6 hours LEC; 102 hours LAB
This course introduces the Plumber and Pipefitter Apprentice to welding techniques and principles of arc and oxy-fuel welding and basic working drawings.

PLUMB 121  Basic Arc Welding and Drawings  4 Units
Enrollment Limitation: Must be a registered Plumber and Pipefitter Apprentice.
Hours: 60 hours LEC; 48 hours LAB
This course introduces the Plumber and Pipefitter Apprentice to welding techniques and principles of arc and oxy-fuel welding and basic working drawings.

PLUMB 122  Advanced Arc Welding  2 Units
Enrollment Limitation: Must be a registered Plumber and Pipefitter Apprentice.
Hours: 8 hours LEC; 100 hours LAB
This course introduces the Plumber and Pipefitter Apprentice to advanced welding techniques and principles of arc and oxy-fuel welding.

PLUMB 130  Gas and Water Supply  4.5 Units
Enrollment Limitation: Must be a registered Plumber and Pipefitter Apprentice.
Hours: 72 hours LEC; 36 hours LAB
This course introduces the Plumber and Pipefitter Apprentice to the supply and treatment of potable water and the design and construction of potable water conveyance systems. It also covers the use of natural gas and liquid propane systems as applied to the plumbing industry.

PLUMB 140  Advanced Drawings and Drainage  4 Units
Enrollment Limitation: Must be a registered Plumber and Pipefitter Apprentice.
Hours: 63 hours LEC; 45 hours LAB
This course introduces the Plumber and Pipefitter Apprentice to advanced building plans and specifications. It also covers drainage systems in residential and commercial settings.

PLUMB 150  Steamfitting and Pipefitting  6 Units
Enrollment Limitation: Must be a registered Plumber and Pipefitter Apprentice.
Hours: 108 hours LEC
This course introduces the Plumber and Pipefitter Apprentice to working knowledge of design, layout, components, safety hazards, and accepted engineering practices with steam heating and hydronic heating and cooling systems.

PLUMB 160  Uniform Plumbing Code and Medical Gas  5.5 Units
Enrollment Limitation: Must be a registered Plumber and Pipefitter Apprentice.
Hours: 98 hours LEC; 43 hours LAB
This course introduces the Plumber and Pipefitter Apprentice to plumbing system code requirements. It also covers installation, testing, and inspection procedures for medical gas and vacuum systems.

PLUMB 161  HVACR Start, Test, and Balance  4 Units
Enrollment Limitation: Must be a registered Plumber and Pipefitter Apprentice.
Hours: 65 hours LEC; 43 hours LAB
This course introduces the Plumber and Pipefitter Apprentice to the knowledge of start, test, and balance practices for Heating Ventilation Air Conditioning and Refrigeration (HVACR) systems and equipment.

PLUMB 162  Refrigeration and Customer Service  6 Units
Enrollment Limitation: Must be a registered Plumber and Pipefitter Apprentice.
Hours: 108 hours LEC
This course introduces the Plumber and Pipefitter Apprentice to basic refrigeration, EPA certification, safety, and customer service.

PLUMB 170  Job Supervision and Foreman Training  4 Units
Enrollment Limitation: Must be a registered Plumber and Pipefitter Apprentice.
Hours: 58 hours LEC; 50 hours LAB
This course introduces the Plumber and Pipefitter Apprentice to the knowledge and skills necessary to properly supervise, schedule, and document a construction project.

PLUMB 180  Supermarket Refrigeration  4 Units
Enrollment Limitation: Must be a registered Plumber and Pipefitter Apprentice.
Hours: 60 hours LEC; 48 hours LAB
This course introduces the Plumber and Pipefitter Apprentice to the fundamentals of oil return and oil separators, electric and hot gas exhaust, multi-stage compressor systems, and pump down systems.

PLUMB 181  Refrigeration Controls and Electrical Troubleshooting  3.5 Units
Enrollment Limitation: Must be a registered Plumber and Pipefitter Apprentice.
Hours: 42 hours LEC; 66 hours LAB
This course introduces the Plumber and Pipefitter Apprentice to refrigeration controls. It also covers electrical troubleshooting in refrigeration systems.

PLUMB 182  Refrigeration and Hydronics Piping  4.5 Units
Enrollment Limitation: Must be a registered Plumber and Pipefitter Apprentice.
Hours: 70 hours LEC; 38 hours LAB
This course introduces the Plumber and Pipefitter Apprentice to the theory and application of psychrometrics, refrigerant piping design, advanced refrigeration, hydronic piping systems, and jobsite hazards. This course also covers customer service and relations as well as preparation for the UA STAR certification exam.
PLUMB 190  Air Conditioning Pneumatic and Process Controls  4.5 Units
Enrollment Limitation: Must be a registered Plumber and Pipefitter Apprentice.
Hours: 73 hours LEC; 147 hours LAB
This course introduces the Plumber and Pipefitter Apprentice to welding techniques and principles of air conditioning pneumatic and process controls.

PLUMB 191  Electrical and Direct Digital Controls  4 Units
Enrollment Limitation: Must be a registered Plumber and Pipefitter Apprentice
Hours: 58 hours LEC; 50 hours LAB
This course introduces the Plumber and Pipefitter Apprentice to electrical control and direct digital control (DDC) systems as they apply to comfort air and building control management.

PLUMB 192  Pneumatic Controls and Computer Literacy  4 Units
Enrollment Limitation: Must be a registered Plumber and Pipefitter Apprentice.
Hours: 65 hours LEC; 43 hours LAB
This course introduces the Plumber and Pipefitter Apprentice to working knowledge of pneumatic control systems. It also covers computer literacy as related to the Heating Ventilation and Air Conditioning (HVAC) industry.

PLUMB 298  Work Experience in Plumbers and Pipefitters Apprenticeship  1-4 Units
Enrollment Limitation: Indentured in the Plumbers and Pipefitters apprenticeship program.
General Education: AA/AS Area III(b)
Hours: 60-300 hours LAB
This course provides students the opportunity to work in the plumbers and pipefitters apprenticeship program for the purpose of developing specific skills to meet the goals and objectives of the Plumbers and Pipefitters Joint Apprenticeship and Training Committee (J.A.T.C.). Students complete work experience hours at approved training sites. Students may take up to 16 units total across all Work Experience course offerings. This course may be repeated when there are new or expanded learning objectives. Only one Work Experience course may be taken per semester.

Pre-Apprenticeship

PREAP 111  Infrastructure Pre-Apprenticeship  7 Units
Corequisite: Concurrent enrollment in FITNS 102.
Advisory: Eligible for ENGRD 310 or ENGRD 312 and ENGRD 330; OR ESLR 340 AND ESLW 340.
Enrollment Limitation: Students must have a high school diploma or GED.
Hours: 77 hours LEC; 147 hours LAB
This course provides an introduction to infrastructure apprenticeships. It covers tools, equipment, materials, and techniques used for building roads, bridges, levees, and rail. Topics also include job safety, physical requirements for different job sites, employability skills for apprenticeship, and California apprenticeship laws. Field trips may be required.

PREAP 112  Infrastructure Pre-Apprenticeship I  3 Units
Hours: 27 hours LEC; 81 hours LAB
This course provides an introduction to infrastructure construction trades apprenticeships. It covers tools, and equipment used for building and maintaining the facilities and systems that create America's infrastructure. Topics also include OSHA/jobsite safety, the safe use of hand and power tools, applied construction math, and employability skills for apprenticeship. This course is not open to students who have completed PREAP 111. Field trips may be required.

PREAP 113  Infrastructure Pre-Apprenticeship II  3 Units
Hours: 27 hours LEC; 81 hours LAB
This course provides an overview of the commercial and industrial construction trades with an emphasis on America's infrastructure. It covers materials and techniques that are used in the infrastructure trades to construct and maintain buildings and related facilities. Topics also include an introduction to construction drawings, material handling simulators, multi-craft skills, and California apprenticeship regulations. This course is not open to students who have completed PREAP 111. Field trips may be required.

PREAP 122  Pre-Apprenticeship for Utility Workers  8 Units
Corequisite: FITNS 100
Advisory: MATH 145
Hours: 96 hours LEC; 144 hours LAB
This course provides preparation for entry-level employment skills for the utility industry. Topics include safety, basic electrical fundamentals, gas principles, excavation, working at heights, industrial ergonomics, radio procedures, and knot tying. Field trips may be required.

PREAP 141  Green Technology Pre-Apprenticeship  7 Units
Corequisite: Concurrent enrollment in FITNS 101.
Advisory: Eligible for ENGRD 310 or ENGRD 312 AND ENGRD 330; OR ESLR 340 AND ESLW 340.
Enrollment Limitation: Students must have a high school diploma or GED.
Hours: 77 hours LEC; 147 hours LAB
This course provides an introduction to Green Technology Pre-Apprenticeship. It covers tools, equipment, materials, and techniques used in the green fields such as electrical, plumbing, heating ventilation and air conditioning (HVAC), and carpentry. Topics include commercial and industrial building energy efficiency, building codes, sustainability, renewable energy, green building, distributed generation systems, utilities, and smart grids. Additional topics include construction drawings, safety training, construction math, and basic communication and employability skills. Field trips may be required.

PREAP 142  Green Technology Pre-Apprenticeship I  3 Units
Hours: 27 hours LEC; 81 hours LAB
This course provides an introduction to Green Technology Pre-Apprenticeship. It covers tools, equipment, materials, and techniques used in the green fields such as electrical, plumbing, heating ventilation and air conditioning (HVAC), and carpentry. Topics include reducing consumer waste, water and other natural resources, recycling, renewable energy, and green building procedures and materials. Additional topics include construction drawings, safety training, construction math, and basic communication and employability skills. This course is not open to students who have completed PREAP 141. Field trips may be required.
Shme 100  Sheet Metal Apprenticeship I 3.3 Units
Enrollment Limitation: Registered Sheet Metal Apprentice
Hours: 40 hours LEC; 58 hours LAB
This course is an introduction to the sheet metal apprenticeship program. Topics include job-site safety practices, basic drafting, basic job-site drawings, and industry terminology.

Shme 101  Sheet Metal Apprenticeship II 3.3 Units
Enrollment Limitation: Registered Sheet Metal Apprentice
Hours: 40 hours LEC; 58 hours LAB
This course is an introduction to sheet metal field installation with an emphasis in basic sheet metal layout, parallel and radial line development and an introduction to triangulation. Topics include soft soldering and drafting of sheet metal prior to fabrication.

Shme 110  Sheet Metal Apprenticeship III 3.3 Units
Enrollment Limitation: Registered Sheet Metal Apprentice
Hours: 40 hours LEC; 58 hours LAB
This course introduces basic layout skills for advanced pattern development. In addition topics include the basic bidding process, trigonometry for the sheet metal industry, fabrication of round fittings, and drafting of pictorial drawings.

Shme 111  Sheet Metal Apprenticeship IV 3.3 Units
Enrollment Limitation: Registered Sheet Metal Apprentice
Hours: 40 hours LEC; 58 hours LAB
This course covers advanced pattern development, architectural sheet metal principles, flashing, and gutters. Topics include hoisting and rigging, as well as installation of fire and smoke dampers.

Shme 120  Sheet Metal Apprenticeship V 3.3 Units
Enrollment Limitation: Registered Sheet Metal Apprentice
Hours: 40 hours LEC; 58 hours LAB
This course is an introduction to heating, ventilating, and air conditioning (HVAC) systems. It includes an overview of the properties of air, heating, and cooling. In addition, this course covers fans and duct systems, and measuring airflow in ductwork.

Shme 121  Sheet Metal Apprenticeship VI 3.3 Units
Enrollment Limitation: Registered Sheet Metal Apprentice
Hours: 40 hours LEC; 58 hours LAB
This course is an introduction to Occupational Safety and Health Administration (OSHA) regulations and a review of safe rigging practices. Topics include job specifications, blueprint reading, field measuring, and installation of package units and built-up systems.

Shme 130  Sheet Metal Apprenticeship VII 3.3 Units
Enrollment Limitation: Registered Sheet Metal Apprentice
Hours: 40 hours LEC; 58 hours LAB
This course covers the design and construction of rooftop steel, advanced plans and specifications, and duct leakage detection. It includes basic electricity for sheet metal workers.

Shme 131  Sheet Metal Apprenticeship VIII 3.3 Units
Enrollment Limitation: Registered Sheet Metal Apprentice
Hours: 40 hours LEC; 58 hours LAB
This course covers testing, adjusting, and balancing of heating, ventilating, and air conditioning (HVAC) systems. Topics include advanced drafting elevation views of shaft duct systems and complete takeoff of a HVAC system with cost, quantity and weight.

Shme 140  Sheet Metal Apprenticeship IX 3.3 Units
Enrollment Limitation: Registered Sheet Metal Apprentice
Hours: 40 hours LEC; 58 hours LAB
This course covers the installation of architectural metal, food service equipment, and commercial exhaust systems. It includes control wiring of these systems.

Shme 141  Sheet Metal Apprenticeship X 3.3 Units
Enrollment Limitation: Registered Sheet Metal Apprentice
Hours: 40 hours LEC; 58 hours LAB
This course covers shop foreman duties, procedures, and leadership training. In addition, the testing, adjusting, and balancing of blow pipe systems are addressed.

Shme 150  Sheet Metal Welding I 2.5 Units
Enrollment Limitation: Registered Sheet Metal Apprentice
Hours: 27 hours LEC; 54 hours LAB
This course covers oxyacetylene cutting, shielded metal arc (SMAW) and gas tungsten arc (GTAW) welding processes typically used in the sheet metal industry. Topics include welding safety procedures and maintenance techniques.

Shme 151  Sheet Metal Welding II 2.5 Units
Enrollment Limitation: Registered Sheet Metal Apprentice
Hours: 27 hours LEC; 54 hours LAB
This course covers advanced shielded metal arc (SMAW) and gas tungsten arc (GTAW) welding processes typically used in the sheet metal industry. Topics include welding safety procedures and maintenance techniques.

Shme 298  Work Experience in Sheet Metal Apprenticeship 1-4 Units
Enrollment Limitation: Indentured in the sheet metal apprenticeship program.
Hours: 60-300 hours LAB
This course provides students the opportunity to work in the sheet metal apprenticeship program for the purpose of developing specific skills to meet the goals and objectives of the sheet metal Joint Apprenticeship and Training Committee (J.A.T.C.). Students complete work experience hours at approved training sites. Students may take up to 16 units total across all Work Experience course offerings. This course may be repeated when there are new or expanded learning objectives. Only one Work Experience course may be taken per semester.
### Sheet Metal Residential Apprenticeship

**SMRA 100 Sheet Metal Residential Apprenticeship I** 3 Units  
*Enrollment Limitation: Registered Sheet Metal Residential Apprentice*  
*Hours: 40 hours LEC; 42 hours LAB*  
This course is an introduction to sheet metal residential apprenticeship, residential and light commercial work, safety, tools, and materials. Topics include an introduction to basic sheet metal layout and fabrication.

**SMRA 101 Sheet Metal Residential Apprenticeship II** 3 Units  
*Enrollment Limitation: Registered Sheet Metal Residential Apprentice*  
*Hours: 40 hours LEC; 42 hours LAB*  
This course covers trade-related mathematics, forklift training, sheet metal soldering, and basic reading of blueprints. Topics include basic layout of sheet metal elbows, offsets and triangulation.

**SMRA 110 Sheet Metal Residential Apprenticeship III** 3 Units  
*Enrollment Limitation: Registered Sheet Metal Residential Apprentice*  
*Hours: 40 hours LEC; 42 hours LAB*  
This course covers servicing, troubleshooting and low voltage controls for residential heating and air conditioning (HVAC) equipment. Topics include residential architectural sheet metal and fabricating flashing, gutters and downspouts.

**SMRA 111 Sheet Metal Residential Apprenticeship IV** 3 Units  
*Enrollment Limitation: Registered Sheet Metal Residential Apprentice*  
*Hours: 40 hours LEC; 42 hours LAB*  
This course covers advanced triangulation, draft and fabrication methods in residential heating, ventilation and air conditioning (HVAC) systems. Topics include servicing furnaces, air conditioners, and alternating-current (AC) control circuits. Additional topics include duct design and system sizing.

### Sheet Metal Technician Apprenticeship

**SMTEC 100 Sheet Metal Service Technician Apprenticeship I** 2.5 Units  
*Enrollment Limitation: Registered Sheet Metal Service Technician*  
*Hours: 27 hours LEC; 54 hours LAB*  
This course is an introduction to the Sheet Metal Service Technician Apprenticeship. Topics include environmental systems, basic refrigeration theory, balancing refrigeration systems, and field safety. It includes the testing, adjusting, and balancing of refrigeration systems.

**SMTEC 101 Sheet Metal Service Technician Apprenticeship II** 2.5 Units  
*Enrollment Limitation: Registered Sheet Metal Service Technician*  
*Hours: 27 hours LEC; 54 hours LAB*  
This course covers diagnosing refrigeration systems, charging and recovery of small hermetic systems, and servicing small heating, ventilating, and air conditioning (HVAC) package units.

**SMTEC 110 Sheet Metal Service Technician Apprenticeship III** 2.5 Units  
*Enrollment Limitation: Registered Sheet Metal Service Technician*  
*Hours: 27 hours LEC; 54 hours LAB*  
This course covers basic electrical fundamentals and control circuits in package air conditioning units. Topics include basic motor principles, construction, and motor control circuits.

**SMTEC 111 Sheet Metal Service Technician Apprenticeship IV** 2.5 Units  
*Enrollment Limitation: Registered Sheet Metal Service Technician*  
*Hours: 27 hours LEC; 54 hours LAB*  
This course covers hermetically sealed electric motors, motor control circuits and their protection. Topics include electrical schematics and diagrams relating to air conditioning equipment.

**SMTEC 120 Sheet Metal Service Technician Apprenticeship V** 2.5 Units  
*Enrollment Limitation: Registered Sheet Metal Service Technician*  
*Hours: 27 hours LEC; 54 hours LAB*  
This course covers duct systems including design, selection, layout, and outlets. Topics include the properties of air, airflow, and heat in heating, ventilating, and air conditioning (HVAC) system design. Additionally, types of heating systems are covered.

**SMTEC 121 Sheet Metal Service Technician Apprenticeship VI** 2.5 Units  
*Enrollment Limitation: Registered Sheet Metal Service Technician*  
*Hours: 27 hours LEC; 54 hours LAB*  
This course covers commercial systems such as walk-in freezers, ice makers, multi-zone systems and an introduction to computerized building management. Topics include constant volume air conditioning systems, and an introduction to pneumatic and electronic environmental system controls.

**SMTEC 130 Sheet Metal Service Technician Apprenticeship VII** 2.5 Units  
*Enrollment Limitation: Registered Sheet Metal Service Technician*  
*Hours: 27 hours LEC; 54 hours LAB*  
This course covers variable air volume systems used in airflow regulation and their electronic control components. Topics include an introduction to the principles and components of direct digital controls (DDC) and energy management systems (EMS).

**SMTEC 131 Sheet Metal Service Technician Apprenticeship VIII** 2.5 Units  
*Enrollment Limitation: Registered Sheet Metal Service Technician*  
*Hours: 27 hours LEC; 54 hours LAB*  
This course coverscommissioning of direct digital control (DDC) systems in energy management systems (EMS). Topics include demand controlled ventilation systems and advanced blueprint reading for service technicians.