American River College conducts, in cooperation with the local construction unions, a number of apprenticeship programs (most of which can lead to an Associates of Arts degree). An apprenticeship program is a formal system of career training from two to five years that combines paid employment, on-the-job training and job related college level instruction in order to develop highly skilled workers.

Apprenticeship programs are a cooperative effort between the Joint Apprenticeship Training Committee (JATC) and the college. The JATC is composed of representatives from both labor and management from each apprenticeship area and their purpose is to oversee apprenticeship training. All American River College apprenticeship programs are approved by the Division of Apprenticeship Standards of the California Department of Industrial Relations.

Enrollment in an apprenticeship course is limited to registered apprentices, however anyone meeting the apprenticeship requirements can apply for acceptance. Information on admission to apprenticeship programs can be obtained from the local JATC having jurisdiction over the trade in which you are interested. Listed below are the program types and contact persons.

DEGREES AND CERTIFICATES

Carpenter Apprenticeship

The Carpenter 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, 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.
- analyze and interpret residential and commercial construction blueprints.
- evaluate, layout, and construct various systems such as floor, wall, roof, and concrete form.
- evaluate and layout a building site using architectural drawings.
- calculate elevations by using an engineer's rod and various leveling devices.
- estimate and order material for construction projects.
- identify and select appropriate materials for each phase of construction.
- develop interpersonal skills with customers, co-workers, and different trades-workers.
- plan projects with given information such as blueprints, specifications, and contract documents.

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.

For more information, contact:
Program Director
800 Chadbourne Rd, Suite A
Fairfield, CA 95485
(707) 399-2880

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

(continued on next page)
Drywall/Lathing Apprenticeship

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=0111512C01 for Gainful Employment Disclosure.

Electrical Apprenticeship

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, interpreter 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.
(Electrical Apprenticeship continued)

Career Opportunities

Upon completion of the electrical program, students may find employment in the following industry sectors: government, commercial and industrial construction and maintenance, utilities, and facilities management. With the degree, students may further their career as licensed contractors.

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

See losrios.edu/gainful-emp-info/gedt.php?major=011582C01 for Gainful Employment Disclosure

Requirements for Degree or Certificate 50.7 Units

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
<th>Units</th>
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<tbody>
<tr>
<td>ELECT 110</td>
<td>Electrical Apprenticeship I</td>
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<tr>
<td>ELECT 111</td>
<td>Electrical Apprenticeship II</td>
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<tr>
<td>ELECT 120</td>
<td>Electrical Apprenticeship III</td>
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</tr>
<tr>
<td>ELECT 121</td>
<td>Electrical Apprenticeship IV</td>
<td>3.3</td>
</tr>
<tr>
<td>ELECT 130</td>
<td>Electrical Apprenticeship V</td>
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</tr>
<tr>
<td>ELECT 131</td>
<td>Electrical Apprenticeship VI</td>
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<tr>
<td>ELECT 140</td>
<td>Electrical Apprenticeship VII</td>
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<td>ELECT 141</td>
<td>Electrical Apprenticeship VIII</td>
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<td>ELECT 150</td>
<td>Electrical Apprenticeship IX</td>
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<tr>
<td>ELECT 151</td>
<td>Electrical Apprenticeship X</td>
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And a minimum of 16 units from the following: ........................................... 16

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELECT 298</td>
<td>Work Experience in Electricians Apprenticeship</td>
<td></td>
</tr>
</tbody>
</table>

Associate Degree Requirements: The Electrical 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 Residential Apprenticeship

This is a three year, six semester certificated Electrical 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.

Student Learning Outcomes

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

- 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.
- 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 41-41.5 Units

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
<th>Units</th>
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<tbody>
<tr>
<td>IW 100</td>
<td>Orientation and History of the Trade</td>
<td>1.5</td>
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<td>IW 110</td>
<td>Mixed Base</td>
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<tr>
<td>IW 120</td>
<td>Rigging</td>
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<td>IW 130</td>
<td>Reinforcing I</td>
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<tr>
<td>IW 131</td>
<td>Reinforcing II/Post Tensioning</td>
<td>1.5</td>
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<tr>
<td>IW 140</td>
<td>Precast Concrete and Metal Buildings</td>
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<tr>
<td>IW 150</td>
<td>Welding I</td>
<td>1.5</td>
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<tr>
<td>IW 151</td>
<td>Welding II</td>
<td>1.5</td>
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<tr>
<td>IW 152</td>
<td>Welding III</td>
<td>1.5</td>
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<tr>
<td>IW 160</td>
<td>Lead Hazard</td>
<td>1.5</td>
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<tr>
<td>IW 170</td>
<td>Structural I</td>
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<tr>
<td>IW 171</td>
<td>Structural II</td>
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</tr>
</tbody>
</table>

(continued on next page)
(Ironworker Apprenticeship continued)

IW 180  Architectural/Ornamental I ........................................1.5
IW 181  Architectural/Ornamental II (1.5) ..........................1.5-2
or IW 184  Detailing I (2)
IW 182  Architectural/Ornamental III (1.5) ..........................1.5
or IW 185  Detailing II (1.5)
IW 183  The History of Ironworkers .................................2.5
And a minimum of 16 units from the following: .......................16
IW 298  Work Experience in Ironworkers Apprenticeship (4)

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

The Residential/Commercial Electrician 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 HVAC systems.
The program 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

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
<th>Units</th>
</tr>
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<tbody>
<tr>
<td>ELECT 210</td>
<td>Electrician Trainee I</td>
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<tr>
<td>ELECT 211</td>
<td>Electrician Trainee II</td>
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<td>ELECT 220</td>
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<tr>
<td>ELECT 221</td>
<td>Electrician Trainee IV</td>
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<tr>
<td>ELECT 230</td>
<td>Electrician Trainee V</td>
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<td>ELECT 231</td>
<td>Electrician Trainee VI</td>
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<tr>
<td>ELECT 280</td>
<td>Electrical Workers State</td>
<td>4.5</td>
</tr>
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</table>

Associate Degree Requirements: The Residential/Commercial
Electrician Trainee Certificate
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 Apprenticeship

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
certificate, 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

Requirements for Degree or Certificate  54 Units

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
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<tbody>
<tr>
<td>SHME 100</td>
<td>Sheet Metal Apprenticeship I</td>
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</tr>
<tr>
<td>SHME 101</td>
<td>Sheet Metal Apprenticeship II</td>
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</tr>
<tr>
<td>SHME 110</td>
<td>Sheet Metal Apprenticeship III</td>
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</tr>
<tr>
<td>SHME 111</td>
<td>Sheet Metal Apprenticeship IV</td>
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</tr>
<tr>
<td>SHME 120</td>
<td>Sheet Metal Apprenticeship V</td>
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<tr>
<td>SHME 121</td>
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<td>SHME 130</td>
<td>Sheet Metal Apprenticeship VII</td>
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</tr>
<tr>
<td>SHME 131</td>
<td>Sheet Metal Apprenticeship VIII</td>
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</tr>
<tr>
<td>SHME 140</td>
<td>Sheet Metal Apprenticeship IX</td>
<td>3.3</td>
</tr>
<tr>
<td>SHME 141</td>
<td>Sheet Metal Apprenticeship X</td>
<td>3.3</td>
</tr>
<tr>
<td>SHME 150</td>
<td>Sheet Metal Welding I</td>
<td>2.5</td>
</tr>
<tr>
<td>SHME 151</td>
<td>Sheet Metal Welding II</td>
<td>2.5</td>
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</table>

And 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
Certificate
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
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 industries: government, residential, and light commercial construction and maintenance. See losrios.edu/gainful-emp-info/gedt.php?major=01X0318C01 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
SHME 298 Work Experience in Sheet Metal Apprenticeship (1 - 4)

Sheet Metal Service Technician Apprenticeship
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.

Requirements for Degree or Certificate
54.2 Units
SHME 100 Sheet Metal Apprenticeship I .............................................................. 3.3
SHME 101 Sheet Metal Apprenticeship II ............................................................. 3.3
SHME 110 Sheet Metal Apprenticeship III ............................................................ 3.3
SHME 111 Sheet Metal Apprenticeship IV ............................................................ 3.3
SMTEC 100 Sheet Metal Service Technician Apprenticeship I ........................... 2.5
SMTEC 101 Sheet Metal Service Technician Apprenticeship II .......................... 2.5
SMTEC 110 Sheet Metal Service Technician Apprenticeship III .......................... 2.5
SMTEC 111 Sheet Metal Service Technician Apprenticeship IV .......................... 2.5
SMTEC 120 Sheet Metal Service Technician Apprenticeship V .......................... 2.5
SMTEC 121 Sheet Metal Service Technician Apprenticeship VI .......................... 2.5
SMTEC 130 Sheet Metal Service Technician Apprenticeship VII ........................ 2.5
SMTEC 131 Sheet Metal Service Technician Apprenticeship VIII ........................ 2.5
SMTEC 140 Sheet Metal Service Technician Apprenticeship IX .......................... 2.5
SMTEC 141 Sheet Metal Service Technician Apprenticeship X ............................ 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 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.

DEPARTMENT CERTIFICATES

Pre-Apprenticeship Certificate
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.

Requirements for Certificate 16 Units
PREAP 111 Infrastructure Pre-Apprenticeship .................................. 7
PREAP 141 Green Technology Pre-Apprenticeship .................................. 7
FITNS 101 Green Technology Workforce Wellness .................................. 1
FITNS 102 Infrastructure Workforce Wellness .................................. 1

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 lifecycle phases of a building and impacts on the green environment over its life cycle.

Requirements for Certificate 8 Units
FITNS 101 Green Technology Workforce Wellness .................................. 1
PREAP 141 Green Technology Pre-Apprenticeship .................................. 7

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
FITNS 102 Infrastructure Workforce Wellness .................................. 1
PREAP 111 Infrastructure Pre-Apprenticeship .................................. 7

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, electrical and gas principles, 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 a high demand for trained entry level workers.

Requirements for Certificate 10.5 Units
FITNS 100 Utility Workforce Wellness .................................. 1
PREAP 122 Pre-Apprenticeship for Utility Workers .................................. 8
MATH 145 Mathematics for the Trades .................................. 1.5

Carpenters Apprenticeship

CARPT 102 Worker Safety and Tool Skills 1.4 Units
Enrollment Limitation: Registered Carpenter Apprentice.
Hours: 18 hours LEC; 18 hours LAB
This course focuses on safety considerations for the carpenter apprentice. Topics include general on-the-job safety, hand and power tool safety, and accident prevention. Instruction leading to certification in scaffold operation is included.

CARPT 104 The Apprentice and the Trade 2 Units
Enrollment Limitation: Registered Carpenter Apprentice.
Hours: 36 hours LEC
This course covers the history of carpenter apprenticeship and the trade. Topics include wages and benefits, workers’ compensation, job placement, collective bargaining, working conditions, and labor-management relations as they pertain to unions, contractors, and cooperatives.

CARPT 106 Introduction to Apprenticeship 1.5 Units
Enrollment Limitation: Registered Carpenter Apprentice.
Hours: 22 hours LEC; 15 hours LAB
This course is an introduction to apprenticeship, tools, safety, and construction job sites in the commercial and industrial building sectors.

CARPT 107 Rigging 1.5 Units
Enrollment Limitation: Registered Carpenter Apprentice.
Hours: 21 hours LEC; 18 hours LAB
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.
CARPT 110  Foundations and Floors  1 Unit
Enrollment Limitation: Must be a registered Carpenter Apprentice.
Hours: 9 hours LEC, 27 hours LAB
This course covers layout, forming, framing, joist, sub-flooring, and foundation construction.

CARPT 112  Structural Framing  1 Unit
Enrollment Limitation: Must be a registered Carpenter Apprentice.
Hours: 9 hours LEC, 27 hours LAB
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 120  Exterior Finish  1 Unit
Enrollment Limitation: Must be a registered Carpenter Apprentice.
Hours: 9 hours LEC, 27 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 Unit
Enrollment Limitation: Must be a registered Carpenter Apprentice.
Hours: 9 hours LEC, 27 hours LAB
This course covers interior design, 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: 21 hours LEC, 18 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. Codes that govern doors and hardware in commercial buildings are also covered.

CARPT 130  Layout/Leveling Construction Site Practice  1 Unit
Enrollment Limitation: Must be a registered Carpenter Apprentice.
Hours: 9 hours LEC, 27 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, Leadership in Energy and Environmental Design (LEED) practices for erosion control.

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 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 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 155  Commercial Concrete  1.3 Units
Enrollment Limitation: Must be a registered Carpenter Apprentice.
Hours: 18 hours LEC, 16 hours LAB
This course covers the use and placement of concrete in residential and commercial construction. Topics include construction and mixing of concrete, 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 160  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 162  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 170  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 180  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 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 200  Construction Mathematics & Introduction to Working Drawing  2 Units
Enrollment Limitation: Registered Apprentice.
Hours: 36 hours LEC
This course covers mathematics applications to the construction trade with specific focus on mathematical processes in carpentry. Topics include an introduction to elements of working drawings used in the construction process.

CARPT 290  Weatherization/Insulation Green Construction Commercial Applications  1 Unit
Enrollment Limitation: Must currently be a displaced journeyperson carpenter as defined by the California Energy Commission grant.
Hours: 12 hours LEC; 18 hours LAB
This course covers installation of energy efficient materials in commercial buildings. Topics include theory and terminology of weatherization and energy efficiency. Pass/No Pass only.

CARPT 291  Introduction to Green Building for Commercial Carpenters  1 Unit
Enrollment Limitation: Must currently be a displaced journeyperson carpenter as defined by the California Energy Commission grant.
Hours: 12 hours LEC; 18 hours LAB
This course covers green building terminology and products for carpenters. It includes an introduction to the Cal Green Building Codes, as well as procedures required to work on green certified projects with emphasis on door seals and hardware. Pass/No Pass only.

CARPT 292  Specialized Green Applications for Commercial Carpenters  1 Unit
Enrollment Limitation: Must currently be a displaced journeyperson carpenter as defined by the California Energy Commission grant.
Hours: 12 hours LEC; 18 hours LAB
This course covers the skills needed for carpenters to install insulated concrete forms. Topics include solar installation, specifications for green products, and best practices for their installation. Pass/No Pass only.

CARPT 298  Work Experience in Carpenters Apprenticeship  1-4 Units
Enrollment Limitation: Indentured in the carpenters apprenticeship program.
Hours: 60-300 hours LAB
This course provides students the opportunity to work in the carpenters apprenticeship program for the purpose of developing specific skills to meet the goals and objectives of the carpenters 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 taken up to four times when there are new or expanded learning objectives. Only one Work Experience course may be taken per semester.

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. Topics includes knot recognition and application to rigging on construction job-sites.

DRLTH 105  Mathematics for Drywall/Lathers  2 Units
Enrollment Limitation: Registered Drywall/Lathing Apprentice.
Hours: 36 hours LEC
This course covers mathematics applications to drywall and lathing trades with specific focus on mathematical processes related to construction. Basic topics include whole numbers, fractions, decimal fractions, ratios, proportions, percentages, areas, and volumes.

DRLTH 110  Residential Metal Framing  1.5 Units
Enrollment Limitation: Registered Drywall/Lathing Apprentice.
Hours: 21 hours LEC; 18 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 doors, windows, door and window framing, and exterior wall covering systems. Topics include an introduction to 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. Topics include an introduction to construction drawings and sketching.

DRLTH 121  Blueprint Reading II  1.5 Units
Prerequisite: DRLTH 120 with a grade of “C” or better; or placement through the assessment process.
Enrollment Limitation: Registered Drywall/Lathing Apprentice.
Hours: 21 hours LEC; 18 hours LAB
This course is a continuation of Blueprint Reading I (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
Prerequisite: DRLTH 121 with a grade of “C” or better; or placement through the assessment process.
Enrollment Limitation: Registered Drywall/Lathing Apprentice.
Hours: 21 hours LEC; 18 hours LAB
This course is a continuation of Blueprint Reading II (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 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, apprentice evaluation procedures, general safety, work ethic, sexual harassment issues, and basic tools of the trade.
DRLTH 131  Welding II  1.5 Units
Prerequisite: DRLTH 130 with a grade of “C” or better; or placement through the assessment process.
Enrollment Limitation: Registered Drywall/Lathing Apprentice.
Hours: 21 hours LEC; 18 hours LAB
This course is a continuation of Welding I (DRLTH 130). Topics include welding safety, concepts, processes, symbols, and certification performance.

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 and 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 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 taken up to four times when there are new or expanded learning objectives. Only one Work Experience course may be taken per semester.

Electrical Apprenticeship

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  3.3 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  3.3 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  3.3 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  3.3 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) and 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 3.3 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 (PLC’s). Topics include use of National Electrical Code (NEC) with cable trays, electric welders, phase converters, hazardous locations, and residential occupancies.

ELECT 150 Electrical Apprenticeship IX 3.3 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 state certification examination.

ELECT 151 Electrical Apprenticeship X 3.3 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. Topics include advanced programmable logic controllers (PLC’s) used in motor control circuits.

ELECT 210 Electrician Trainee I 4 Units  
Advisory: ELECT 298, ET 310, MATH 100, MATH 104, or MATH 132  
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 and DC theory.

ELECT 211 Electrician Trainee II 4 Units  
Prerequisite: ELECT 210 with a grade of “C” or better.  
Hours: 63 hours LEC; 27 hours LAB  
This course is the second course required for the Commercial/Residential Electrician Trainee program. Topics include AC theory, AC and DC generation, phase, and circuit mathematical calculations; calculating inductance, capacitance, and reactance in series, parallel and series-parallel circuits. It also includes use of meters in different applications of alternating current. This course provides a basic introduction to electronics used in electrical installations; and an introduction and application of the National Electrical Code to job-site electrical installations.

ELECT 220 Electrician Trainee III 4 Units  
Prerequisite: ELECT 211 with a grade of “C” or better.  
Hours: 63 hours LEC; 27 hours LAB  
This course 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, identifying common blueprint scales and electrical symbols.

ELECT 221 Electrician Trainee IV 4 Units  
Prerequisite: ELECT 211 with a grade of “C” or better.  
Hours: 63 hours LEC; 27 hours LAB  
This course 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 personal development and job-site management.

ELECT 230 Electrician Trainee V 4 Units  
Prerequisite: ELECT 211 with a grade of “C” or better.  
Hours: 63 hours LEC; 27 hours LAB  
This course is the fifth course required for the Commercial/Residential Electrician Trainee program. Topics include fundamentals of motors, motor controllers, process controllers, generators, and transformers. It also includes testing of cables, generators and motors.

ELECT 231 Electrician Trainee VI 4 Units  
Prerequisite: ELECT 211 with a grade of “C” or better.  
Hours: 63 hours LEC; 27 hours LAB  
This course is the sixth course required for the Commercial/Residential Electrician Trainee program. Topics include fire alarm systems, burglar alarm systems, and information transport systems (voice, data and video). It also covers basic electrical requirements for heating, air conditioning and refrigeration systems.

ELECT 280 Electrical Workers State Certification Preparation 4.5 Units  
Advisory: Three years or more of electrical trade experience.  
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.

ELECT 281 Green Technology 2 Units  
High Efficiency Lighting  
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 282 PV/Solar Installer 1.5 Units  
Enrollment Limitation: Must be a current California State Certified General Electrician.  
Hours: 18 hours LEC; 18 hours LAB  
This course covers installing, troubleshooting, commissioning, and maintaining photovoltaic/solar electrical energy systems. Pass/No Pass only.

ELECT 283 Energy Auditing 1 Unit  
Enrollment Limitation: Must be a California State Certified General Electrician.  
Hours: 13.5 hours LEC; 13.5 hours LAB  
This course covers data gathering on building envelope energy usage. It also covers energy efficiency analysis, quantification of potential energy savings, and financial benefits. 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(b)
Hours: 60-300 hours LAB
This course provides students 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 taken up to four times when there are new or expanded learning objectives. Only one Work Experience course may be taken per semester.

**Electrical Residential Apprenticeship**

ELRES 100  Electrical Residential Apprenticeship I  3 Units
Enrollment Limitation: Registered Electrical Residential Apprentice
Hours: 39 hours LEC; 45 hours LAB
This course is an introduction to electrical residential apprenticeship. Topics include apprenticeship orientation, safety procedures, basic electrical mathematics, conduit bending, and an introduction to the National Electrical Code (NEC). It also focuses on defining and analyzing DC theory, basic electrical layout, materials, fasteners and tools used on the construction job site.

ELRES 101  Electrical Residential Apprenticeship II  3 Units
Enrollment Limitation: Registered Electrical Residential Apprentice
Hours: 39 hours LEC; 45 hours LAB
This course covers application of electrical mathematics to the properties of resistance, voltage, current, and power in series, parallel, and combination DC circuits. Topics include interpreting architectural views, common scales, mechanical, and electrical symbols as used in residential blueprints.

ELRES 110  Electrical Residential Apprenticeship III  3 Units
Enrollment Limitation: Registered Electrical Residential Apprentice
Hours: 39 hours LEC; 45 hours LAB
This course covers AC theory, inductance, capacitance, series, parallel and combination circuits. Topics include codeology as it applies to the National Electrical Code (NEC) and basic fundamentals of electromagnetism as it applies to generators and transformers.

ELRES 111  Electrical Residential Apprenticeship IV  3 Units
Enrollment Limitation: Registered Electrical Residential Apprentice
Hours: 39 hours LEC; 45 hours LAB
This course covers National Electrical Code (NEC) requirements for services, conduit wiring methods, boxes, fittings, grounding and bonding for residential job sites. Topics include an introduction to residential heating, ventilating and air conditioning (HVAC), Community Antenna Television (CATV), phone, fire alarm, burglar alarm, and home automation systems.

ELRES 120  Electrical Residential Apprenticeship V  3 Units
Enrollment Limitation: Registered Electrical Residential Apprentice
Hours: 39 hours LEC; 45 hours LAB
This course covers advanced AC and DC principles, over-current protection, residential load calculations, motor terminations, and paging systems. Topics include a residential design project involving layout, circuit planning, and load calculations.

ELRES 121  Electrical Residential Apprenticeship VI  3 Units
Enrollment Limitation: Registered Electrical Residential Apprentice
Hours: 39 hours LEC; 45 hours LAB
This course covers advanced home automation applications, photo-voltaic systems, fiber optics, local area networks (LAN) systems, lightning protections systems, swimming pools, and fountains. Topics include an advanced residential project.

**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 is an introduction to Ironworker’s Apprenticeship responsibilities. It includes Ironworker’s rules and regulations, record keeping, as well as evaluations and advancement, work ethic, sexual harassment issues, and basic tools. It acquaints the Iron Worker apprentice with specifications that constitute a safe and healthful working environment under OSHA. It provides an introduction to the rights and obligations that OSHA imposes. An orientation and overview of the history of the Ironwork trade is presented.

IW 110  Mixed Base  1.5 Units
Enrollment Limitation: Registered Ironworkers Apprentice.
Hours: 18 hours LEC; 27 hours LAB
This Mixed Base course acquaints the Iron Worker apprentice with an overview of the type of construction blueprints commonly used with emphasis on function and interpretation. This course offers a brief review of basic math skills and provides an opportunity to apply these skills in solving typical problems relevant to the construction trades.

IW 120  Rigging  1.5 Units
Enrollment Limitation: Registered Ironworkers Apprentice.
Hours: 18 hours LEC; 27 hours LAB
This course is an introduction to rigging operations such as wire rope, chains, slings, cranes, helicopters, ladders and scaffolds. Also included are rigging safety, knot recognition and strength identification, as well as knot application to 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 the ironworker. 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 introduced.
IW 130  Rebar & Reinforcing I  1.5 Units
Prerequisite: IW 120 with a grade of “C” or better.
Enrollment Limitation: Registered Ironworkers Apprentice.
Hours: 18 hours LEC, 27 hours LAB
This course introduces the concepts of ferrous metals and their reaction to heat. It provides knowledge of the equipment and materials used in rebar installations. Special emphasis is placed on the use of the equipment and materials in the use of rebar and steel products.

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 these 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 provides knowledge of the equipment and materials employed in the use of shielded metal-arc, gas shielded-arc, and oxy-acetylene welding.

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 extends 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.
Hours: 18 hours LEC, 27 hours LAB
This course focuses on skill development in shielded metal arc and gas shielded 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 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 comprehensive 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.
OE3 101  Introduction to Operators  8 Units  
Enrollment Limitation: Registered Operating Engineer Apprentice.  
Hours: 120 hours LEC; 72 hours LAB  
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.

OE3 102  Introduction to Heavy Duty Repair  8 Units  
Enrollment Limitation: Registered Operating Engineer Apprentice.  
Hours: 120 hours LEC; 72 hours LAB  
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.

OE3 103  Introduction to Crane Operators  12 Units  
Enrollment Limitation: Registered Operating Engineer Apprentice.  
Hours: 164 hours LEC; 156 hours LAB  
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.

OE3 104  Introduction to Grade Setter  8 Units  
Enrollment Limitation: Registered Operating Engineer Apprentice.  
Hours: 120 hours LEC; 72 hours LAB  
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.

OE3 110  Introduction to Dredge Operation  3 Units  
Enrollment Limitation: Registered Operating Engineer Apprentice.  
Hours: 41 hours LEC; 39 hours LAB  
This course introduces dredge operations. Topics include principles of 
dredging, water safety, knot tying, hand signals, and crane 
operations for dredging operations.

OE3 112  Seamanship I  3 Units  
Enrollment Limitation: Registered Operating Engineer Apprentice.  
Hours: 41 hours LEC; 39 hours LAB  
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.

OE3 115  Seamanship II  3 Units  
Prerequisite: OE3 112 with a grade of “C” or better  
Enrollment Limitation: Registered Operating Engineer Apprentice.  
Hours: 41 hours LEC; 39 hours LAB  
This course is a continuation of OE3 112. Advanced topics include 
marine rescue, lifeboat seamanship, dredging material handling, 
shipboard fire suppression, and shore operations.

OE3 120  Plant Operations  3 Units  
Enrollment Limitation: Registered Operating Engineer Apprentice.  
Hours: 41 hours LEC; 39 hours LAB  
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.

OE3 121  Welding and Cutting  3 Units  
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.

OE3 130  Backhoe & Excavator Operations  3 Units  
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.

OE3 131  Grade Checking  3 Units  
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 levels, street section grading, Global Positioning System (GPS) 
devices, plan reading, metric conversions, and locating underground 
infrastructure.

OE3 132  Scrapers  3 Units  
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.

OE3 133  Loaders  3 Units  
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, transporring, stockpiling, and hand signals.

OE3 134  Motor Grader  3 Units  
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.

OE3 135  Dozers  3 Units  
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.

OE3 136  Directional Drilling  3 Units  
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.

OE3 140  Boom Pumps  3 Units  
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.
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 slope layout, sidewalk, curb, and gutter grading, and catch point slope staking using global positioning systems (GPS) for Trimble systems.

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 course 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 taken up to four times 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: FITNS 102
Advisory: ENGRD 116 with a grade of “C” or better; OR ESLR 320 and ESLW 320 with a grade of “C” or better
Enrollment Limitation: Students must have a high school diploma or GED.
Hours: 77 hours LEC; 147 hours LAB
This course provides an introduction to transportation infrastructure apprenticeship. 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 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: FITNS 101
Advisory: ENGW 102 or 103, and ENGRD 116 with a grade of “C” or better; OR ESLR 320 and ESLW 320 with a grade of “C” or better. 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.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
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<tbody>
<tr>
<td>SHME 100</td>
<td>Sheet Metal Apprenticeship I</td>
<td>3.3 Units</td>
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<td>Enrollment Limitation: Registered Sheet Metal Apprentice</td>
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<td></td>
<td>Hours: 40 hours LEC; 58 hours LAB</td>
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<td></td>
<td>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.</td>
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<tr>
<td>SHME 101</td>
<td>Sheet Metal Apprenticeship II</td>
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<td>Hours: 40 hours LEC; 58 hours LAB</td>
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<td></td>
<td>This course 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.</td>
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<tr>
<td>SHME 110</td>
<td>Sheet Metal Apprenticeship III</td>
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<td>Enrollment Limitation: Registered Sheet Metal Apprentice</td>
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<td>Hours: 40 hours LEC; 58 hours LAB</td>
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<td>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.</td>
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<td>SHME 111</td>
<td>Sheet Metal Apprenticeship IV</td>
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<td>Enrollment Limitation: Registered Sheet Metal Apprentice</td>
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<td>Hours: 40 hours LEC; 58 hours LAB</td>
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<td></td>
<td>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.</td>
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<tr>
<td>SHME 120</td>
<td>Sheet Metal Apprenticeship V</td>
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<td>Hours: 40 hours LEC; 58 hours LAB</td>
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<td></td>
<td>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.</td>
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<tr>
<td>SHME 121</td>
<td>Sheet Metal Apprenticeship VI</td>
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<td>Hours: 40 hours LEC; 58 hours LAB</td>
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<td>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.</td>
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<td>SHME 130</td>
<td>Sheet Metal Apprenticeship VII</td>
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<td>Hours: 40 hours LEC; 58 hours LAB</td>
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<td>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.</td>
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<tr>
<td>SHME 131</td>
<td>Sheet Metal Apprenticeship VIII</td>
<td>3.3 Units</td>
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<td>Enrollment Limitation: Registered Sheet Metal Apprentice</td>
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<td></td>
<td>Hours: 40 hours LEC; 58 hours LAB</td>
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<td></td>
<td>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.</td>
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<td>SHME 140</td>
<td>Sheet Metal Apprenticeship IX</td>
<td>3.3 Units</td>
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<td>Enrollment Limitation: Registered Sheet Metal Apprentice</td>
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<td>Hours: 40 hours LEC; 58 hours LAB</td>
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<td>This course covers the installation of architectural metal, food service equipment, and commercial exhaust systems. It includes control wiring of these systems.</td>
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<td>SHME 141</td>
<td>Sheet Metal Apprenticeship X</td>
<td>3.3 Units</td>
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<td>Hours: 40 hours LEC; 58 hours LAB</td>
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<td>This course covers shop foreman duties, procedures, and leadership training. In addition, the testing, adjusting, and balancing of blow pipe systems are addressed.</td>
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<td>SHME 150</td>
<td>Sheet Metal Welding I</td>
<td>2.5 Units</td>
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<td>Enrollment Limitation: Registered Sheet Metal Apprentice</td>
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<td></td>
<td>Hours: 27 hours LEC; 54 hours LAB</td>
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<td>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.</td>
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<tr>
<td>SHME 151</td>
<td>Sheet Metal Welding II</td>
<td>2.5 Units</td>
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<td>Hours: 27 hours LEC; 54 hours LAB</td>
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<td></td>
<td>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.</td>
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</tbody>
</table>
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.

SMTEC 101  Sheet Metal Service Technician Apprenticeship II  2.5 Units
Enrollment Limitation: Registered Sheet Metal Apprentice
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 Apprentice
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 Apprentice
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 Apprentice
Hours: 27 hours LEC; 54 hours LAB
This course covers chilled water systems, air cooled condensers, water cooled condensers, refrigerant lines and flow control devices. Topics include heat load calculations for cooling systems and heat pump operation, components, and controls.

SMTEC 121  Sheet Metal Service Technician Apprenticeship VI  2.5 Units
Enrollment Limitation: Registered Sheet Metal Apprentice
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 Apprentice
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 140  Sheet Metal Service  
Technician Apprenticeship IX  2.5 Units

Enrollment Limitation: Registered Sheet Metal Apprentice
Hours: 27 hours LEC; 54 hours LAB

This course covers the installation and application of direct digital control (DDC) systems in energy management systems (EMS). Topics include an introduction to blueprint reading for service technicians, and the testing and balancing of heating, ventilating, and air conditioning (HVAC) systems integrated with EMS.

SMTEC 141  Sheet Metal Service  
Technician Apprenticeship X  2.5 Units

Enrollment Limitation: Registered Sheet Metal Apprentice
Hours: 27 hours LEC; 54 hours LAB

This course covers commissioning of direct digital control (DDC) systems in energy management systems (EMS). Topics include demand controlled ventilation systems and advanced blueprint reading for service technicians.

SMTEC 292  HVAC Energy Utilization  3.5 Units

Enrollment Limitation: Must currently be a displaced journeyperson sheet metal worker as defined by the California Energy Commission grant.
Hours: 54 hours LEC; 36 hours LAB

This course covers Heating, Ventilating, Air Conditioning (HVAC) system energy utilization. Topics include maximum efficiency and occupant comfort.