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A.A. Degree: Carpenter Apprenticeship  
 Drywall/Lathing Apprenticeship  
 Electrical Apprenticeship  
 Ironworker Apprenticeship  
 Sheet Metal Apprenticeship  
 Sheet Metal Service Technician  
 Apprenticeship

Certificates: Carpenters Apprenticeship  
 Drywall/Lathing Apprenticeship  
 Electrical Apprenticeship  
 Electrical Residential Apprenticeship  
 Ironworker Apprenticeship  
 Residential/Commercial Electrician Trainee  
 Sheet Metal Apprenticeship  
 Sheet Metal Residential  
 Sheet Metal Service Technician  
 Apprenticeship

Department Certificates:  
 Pre-Apprenticeship  
 Green Technology Pre-Apprenticeship  
 Infrastructure Pre-Apprenticeship  
 Utilities Worker Pre-Apprenticeship

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**

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](http://losrios.edu/gainful-emp-info/gedt.php?major=011247C01) for Gainful Employment Disclosure.

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**(Carpenter Apprenticeship continued)**

Requirements	Degree or Certificate	36.3 Units
CARPT 102	Worker Safety and Tool Skills	1.4
CARPT 104	The Apprentice and the Trade	2
CARPT 110	Foundations and Floors	1
CARPT 112	Structural Framing	1
CARPT 114	Form Detailing, Construction & Erection	1
CARPT 120	Exterior Finish	1
CARPT 122	Interior Finish	1
CARPT 130	Layout/Leveling Construction Site Practice	1
CARPT 140	Interior Systems	1.3
CARPT 142	Engineered Structural Systems	1
CARPT 150	Concrete - Precast and Prestressed	1
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
CARPT 200	Construction Mathematics & Introduction to Working Drawing	2
<b>And a minimum of 16 units from the following:</b>		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**

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](http://losrios.edu/gainful-emp-info/gedt.php?major=011512C01) for Gainful Employment Disclosure.

Requirements	Degree or Certificate	41 Units
DRLTH 100	Introduction to the Trade	2
DRLTH 102	Basic Applications	1.5
DRLTH 105	Mathematics for Drywall/Lathers	2
DRLTH 110	Residential Metal Framing	1.5
DRLTH 112	Doors, Windows, Exterior Systems/Building Documents	1.5
DRLTH 120	Blueprint Reading I	1.5
DRLTH 121	Blueprint Reading II	1.5
DRLTH 122	Blueprint Reading III	1.5
DRLTH 130	Welding I	1.5
DRLTH 131	Welding II	1.5
DRLTH 140	Exterior/Advanced Fire Control System and Partitions	1.5
DRLTH 142	Exterior Systems and Trims	1.5
DRLTH 150	Interior Metal Lathing System, Sound Control	1.5
DRLTH 160	Ceilings, Shaft Protection and Demountable Partitions	1.5
DRLTH 162	Arches, Furring and Advanced Systems	1.5
DRLTH 170	Advanced Construction Techniques	1.5
<b>And a minimum of 16 units from the following:</b>		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**

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.

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*(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

**Requirements for Degree or Certificate 50.7 Units**

ELECT 110	Electrical Apprenticeship I .....	5
ELECT 111	Electrical Apprenticeship II .....	3.3
ELECT 120	Electrical Apprenticeship III .....	3.3
ELECT 121	Electrical Apprenticeship IV .....	3.3
ELECT 130	Electrical Apprenticeship V .....	3.3
ELECT 131	Electrical Apprenticeship VI .....	3.3
ELECT 140	Electrical Apprenticeship VII .....	3.3
ELECT 141	Electrical Apprenticeship VIII .....	3.3
ELECT 150	Electrical Apprenticeship IX .....	3.3
ELECT 151	Electrical Apprenticeship X .....	3.3

**And a minimum of 16 units from the following:** ..... 16  
 ELECT 298 Work Experience in Electricians Apprenticeship

**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:*

- apply residential electrical safety procedures to the work-site.
- analyze, interpret, and apply the National Electric Codes to residential and light commercial construction.
- analyze and install transformers and control panels.
- analyze and install low voltage systems such as TV, phone, burglar alarms, and HVAC control wiring.
- analyze and interpret residential construction blueprints.
- apply electrical mathematics in calculating resistance, voltage, and amperes in AC/DC series, parallel, and series parallel circuits.

**Career Opportunities**

Upon completion of the Electrical Residential Apprenticeship program, students may find employment in the following industry sectors: government, residential, and light commercial construction and maintenance.

**Enrollment Eligibility**

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

- Must be a Registered Electrical Residential Apprentice

See [losrios.edu/gainful-emp-info/gedt.php?major=011582C01](http://losrios.edu/gainful-emp-info/gedt.php?major=011582C01) for Gainful Employment Disclosure

**Requirements for Certificate 18 Units**

ELRES 100	Electrical Residential Apprenticeship I.....	3
ELRES 101	Electrical Residential Apprenticeship II.....	3
ELRES 110	Electrical Residential Apprenticeship III.....	3
ELRES 111	Electrical Residential Apprenticeship IV.....	3
ELRES 120	Electrical Residential Apprenticeship V.....	3
ELRES 121	Electrical Residential Apprenticeship VI.....	3

**Ironworker Apprenticeship**

The Ironworker Apprenticeship Program has training for Field Ironworkers and Reinforcing Ironworkers. Training is provided in major ironworker components to 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](http://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:*

- 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**

IW 100	Orientation and History of the Trade .....	1.5
IW 110	Mixed Base .....	1.5
IW 120	Rigging .....	1.5
IW 130	Reinforcing I .....	1.5
IW 131	Reinforcing II/Post Tensioning .....	1.5
IW 140	Precast Concrete and Metal Buildings .....	1.5
IW 150	Welding I .....	1.5
IW 151	Welding II .....	1.5
IW 152	Welding III .....	1.5

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**(Ironworker Apprenticeship continued)**

IW 160	Lead Hazard .....	1.5
IW 170	Structural I .....	1.5
IW 171	Structural II .....	1.5
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
<b>And a minimum of 16 units from the following:</b> .....		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**

ELECT 210	Electrician Trainee I .....	4
ELECT 211	Electrician Trainee II .....	4
ELECT 220	Electrician Trainee III .....	4
ELECT 221	Electrician Trainee IV .....	4
ELECT 230	Electrician Trainee V .....	4
ELECT 231	Electrician Trainee VI .....	4
ELECT 280	Electrical Workers State Certification Preparation .....	4.5

**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](http://losrios.edu/gainful-emp-info/gedt.php?major=011249C01) for Gainful Employment Disclosure

**Requirements for Degree or Certificate 54 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
SHME 120	Sheet Metal Apprenticeship V .....	3.3
SHME 121	Sheet Metal Apprenticeship VI .....	3.3
SHME 130	Sheet Metal Apprenticeship VII .....	3.3
SHME 131	Sheet Metal Apprenticeship VIII .....	3.3
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
<b>A minimum of 16 units from the following:</b> .....		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

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](http://losrios.edu/gainful-emp-info/gedt.php?major=011390C01) for Gainful Employment Disclosure.

<b>Requirements for Certificate</b>		<b>28 Units</b>
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
<b>A minimum of 16 units from the following:</b> .....		<b>16</b>
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](http://losrios.edu/gainful-emp-info/gedt.php?major=01X0318C01) for Gainful Employment Disclosure.

<b>Requirements for Degree or Certificate</b>		<b>54.2 Units</b>
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
<b>A minimum of 16 units from the following:</b> .....		<b>16</b>
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.

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**(Pre-Apprenticeship Certificate continued)**

- implement a personal fitness plan using proper strength and cardiovascular training.

See [losrios.edu/gainful-emp-info/gedt.php?major=011246C01](http://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 life cycle 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 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**

*Prerequisite: None*  
*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**

*Prerequisite: None*  
*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 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: 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, and 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 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 155 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 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**

*Prerequisite: None  
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 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 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 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 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 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 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 250 Introduction to Structural Blueprints & Layout Instruments 1.5 Units**

*Enrollment Limitation: Must be a registered Piledriver apprentice.  
Hours: 24 hours LEC; 12 hours LAB*

This course introduces Piledriver apprentices to structural blueprint reading and layout.

**CARPT 252 Falsework, Shoring, and Heavy Timber Framing 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 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 Piledriver 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 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 268 Welding II 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 light gauge welding using shielded metal arc welding (SMAW) and flux core arc welding (FCAW). It also covers safety, ergonomics, the safe use of hand and power tools, and tool maintenance.

**CARPT 290 Weatherization/Insulation Green Construction Commercial Applications 1 Unit**

*Enrollment Limitation: Must currently be a displaced journeyman 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 journeyman 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 journeyman 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.

**Drywall/Lathing 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, apprentice 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 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 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 over-current 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 special 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 is the second course required for the Commercial/Residential Electrician Trainee program. It 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. This course provides a basic introduction to electronics 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 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.

**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 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 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). 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 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 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 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 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, helicopters, ladders, 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 181 Architectural/Ornamental II 1.5 Units**  
*Prerequisite: IW 180 with a grade of "C" or better.*  
*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.
- IW 182 Architectural/Ornamental III 1.5 Units**  
*Prerequisite: IW 181 with a grade of "C" or better.*  
*Hours: 18 hours LEC; 27 hours LAB*  
 This course is a continuation of IW 181. Topics include store fronts and entranceways, revolving doors, swing doors and closers, sliding fronts/sliding doors, hollow metal doors, balanced doors, and rolling services doors. Additionally the installation of sloped walls, stair and glass railings, wall handrails, ladders, toilet partitions, vanity supports, relief angles, flagpoles, and chain link fences 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 184 Detailing I 2 Units**  
*Prerequisite: None*  
*Enrollment Limitation: Registered Ironworkers Apprentice.*  
*Hours: 40 hours LEC*  
 This course describes the process of ironwork detailing. Topics include drawing placement, communication instruments, bar lists, bar schedules, mathematical computation and blueprint reading.

**IW 185 Detailing II 1.5 Units**

*Prerequisite: IW 184 with a grade of "C" or better.  
Hours: 18 hours LEC; 27 hours LAB*

This course covers the procedures and practices employed by the detailer of reinforcing iron. Analysis and interpretation of placing patterns and practices in the erection of a wide variety of reinforced concrete structures are presented.

**IW 298 Work Experience in Iron workers Apprenticeship 1-4 Units**

*Enrollment Limitation: Indentured in the iron workers apprenticeship program.  
General Education: AA/AS Area III(b)  
Hours: 60-300 hours LAB*

This course provides students the opportunity to work in the iron workers apprenticeship program for the purpose of developing specific skills to meet the goals and objectives of the iron workers 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.

**Operating Engineers**

**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 levelers, 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, transporting, 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 sloping pad 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 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: Concurrent enrollment in FITNS 102.*  
*Advisory: Eligible for ENGRD 310 or ENGRD 312 AND ENGRD 300; 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 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 300; 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.

**Sheet Metal Apprenticeship**

**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 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 taken up to four times 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 Apprentice  
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 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 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 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 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 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 131 Sheet Metal Service Technician  
Apprenticeship VIII 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 journeyman sheetmetal 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.