Electrician Apprenticeship, Norco College
CCC-501 Application for Approval—New Program

Item 1. Program Goals and Objectives.

The new 35 unit Electrician Apprenticeship certificate and AS degree will create a five-year apprenticeship program with the International Brotherhood of Electrical Workers (IBEW). Norco College will become the Lead Education Agency for the program.

The goal of the Electrician Apprenticeship Program at Norco College is to provide electrical apprentices with the up-to-date knowledge and technical skills to complete the California state requirements to begin a career as a licensed journeyman, a craftsperson recognized for his or her knowledge and ability in the selected trade. The program will allow students to work in the trade while taking courses. The students will be earning a wage while on the job. As they progress through the apprenticeship they will increase their skill set.

Program Learning Outcomes:

1. Apply a working knowledge of math formulas and complex solution methods related to the electrical trades, along with blueprint symbols and drawings of wiring diagrams with the common schematic symbols, including troubleshooting of common system faults, detection and repair, while properly applying OSHA construction site safety standards to all practices.
2. Properly apply all pertinent National Electric Code (NEC) to all workplace practices, involving DC, AC, singly & poly-phase systems, utilizing proper grounding, bonding, lightning protections, wire sizing, conduit fill, overload protection, layout, connections, installations troubleshooting, fault isolation, repairs or modifications.
3. Demonstrate appropriate leadership and expertise in applying special control and monitoring functions related to layout, installation, testing, and troubleshooting of digital and analog systems involving such ancillary equipment as CATV, CCTV, telephone circuits, Programmable Logic Controllers (PLCs), sensors, actuators, low-voltage and high-voltage, transformation, interfacing, hardware, setup, and programming services needed to comply with all NFPA-70E (NEC) and OSHA regulations for safety and fitness.

Residents within Riverside/San Bernardino/ Mono/Inyo counties will be able to jointly apply to the Riverside and San Bernardino Joint Electrical Apprenticeship Training Committees via the International Brotherhood of Electrical Workers. Applicants must submit proof of high school diploma or GED, be at least 18 years of age, and official unopened transcripts showing successful completion of one year of high school or College Algebra 1 or higher. The applicant will then complete a written aptitude test and oral interview to be placed on the eligibility list.

ITEM 2. Catalog Description

Electrician (AP E)
A five-year apprenticeship program, consisting of fulltime, on the job employment plus related classroom instruction. Completers of this program may qualify for certificate, Associates of Science Degree, and/or a Journeyperson trade certificate. Students who wish to obtain an Associate in Arts

Degree may do so by fulfilling the general graduation requirements in addition to the completion of the apprenticeship courses.
Applications for Riverside/San Bernardino/ Mono/Inyo counties should apply to the Riverside and San Bernardino Joint Electrical Apprenticeship Training. Committees, 1855 Business Center Drive, San Bernardino, CA 92408. Telephone: (909) 890-1703.

ITEM 3. Program Requirements

Dept. Name/#	Name	Units	Sequence
ELE 35	Introduction to the Electrical Trades and Construction Safety	3.5	Yr 1, Fall
ELE 41	Introduction to Electrical Theory, Basic Math Concepts, and the National Electric Code	3.5	Yr 1, Spring
ELE 42	Advanced DC Circuit Concepts, Introduction to 3-Phase AC Circuits, Test Equipment, and National Electric Code Applications	3.5	Yr 2, Fall
ELE 43	AC Circuit Concepts, Applied Electronics, and National Electric Code Applications	3.5	Yr 2, Spring
ELE 44	Digital Logic Circuits, Conductor Characteristics, Applications, and National Electric Code (NEC)	3.5	Yr 3, Fall
ELE 45	Electrician Blueprint Reading with Code Applications for National Electrical Code (NEC)	3.5	Yr 3, Spring
ELE 46	Grounding Systems, Advanced Blueprints and Specifications, Motor Design and Installation, and National Electric Code	3.5	Yr 4, Fall
ELE 47	Motor Control Principles, Generators and Power Supplies, with National Electric Code (NEC)	3.5	Yr 4, Spring
ELE 48	Transformer Theory, Leadership, Management, and Test Equipment	3.5	Yr 5, Fall
ELE 49	Electrician Specialty Systems	3.5	Yr 6, Spring

Required Major Total: 35 Units

REQUIRED MAJOR COURSES

ELE-35: Introduction to the Electrical Trades and Construction Safety
Lecture Hours: 45
Lab Hours: 54
Units: 3.50

COURSE DESCRIPTION
Prerequisite: None.

Focusing on electrical trades, students will examine safety issues surrounding construction job-sites and installation of electrical systems. Includes OSHA 10 Construction certification training, identification of job-site hazards, safe work practices and personal protective equipment for various construction site hazards. Care for breathing and cardiac emergencies along with basic first aid and automatic external defibrillator (AED) training for use on both adults and children. Substance abuse will be addressed. Basic math operations will be reviewed and reinforced. 45 hours lecture and 54 hours laboratory.

SHORT DESCRIPTION FOR CLASS SCHEDULE
Electrician training includes construction job-site OSHA safety, first aid and CPR with AED, safe work practices, hazard identification, personal protective equipment, substance abuse, and math review for electrical trade workers.

ELE-41: Introduction to Electrical Theory, Basic Math Concepts, and the National Electric Code
Lecture Hours: 45
Lab Hours: 54
Units: 3.50

COURSE DESCRIPTION
Prerequisite: None.

Provides an introduction to algebraic and trigonometric concepts and application of their principles to solve basic electrical equations and layout conduit bends. Teaches the student to apply basic electrical theory to predict circuit behavior. Basic conduit bending techniques will be developed. The National Electrical Code will be introduced. 45 hours lecture and 54 hours laboratory.

SHORT DESCRIPTION FOR CLASS SCHEDULE
Introduction to math concepts and application of their principles to solve basic electrical equations and layout conduit bends. Teaches the student to apply basic electrical theory to predict circuit behavior. Basic conduit bending techniques will be developed. The National Electric Code will be introduced.

ELE-42: Advanced DC Circuit Concepts, Introduction to 3-Phase AC Circuits, Test Equipment, and National Electric Code Applications
Lecture Hours: 45
Lab Hours: 54
Units: 3.50

COURSE DESCRIPTION
Prerequisite: None.

Electrician circuit analysis techniques, series, parallel, and combination DC circuits, test equipment, National Electric Code (NEC), and elementary 3-Phase AC circuits will be introduced. 45 hours lecture and 54 hours laboratory.

SHORT DESCRIPTION FOR CLASS SCHEDULE
Circuit analysis techniques, series, parallel, and combination DC circuits, test equipment, National Electric Code (NEC), and basic 3-Phase AC circuits

ELE-43: AC Circuit Concepts, Applied Electronics, and National Electric Code Applications
Lecture Hours: 45
Lab Hours: 54
Units: 3.50

COURSE DESCRIPTION
Prerequisite: None.

Electrician AC theory including an exploration of inductance and capacitance and the effect of their combined reactants on AC circuits along with the application of electronic concepts and components. 45 hours lecture and 54 hours laboratory.

SHORT DESCRIPTION FOR CLASS SCHEDULE
Electrician AC theory including inductance, capacitance, reactance, and impedance in AC circuits, with applications of electronic concepts and components.

ELE-44: Digital Logic Circuits, Conductor Characteristics, Applications, and National Electric Code (NEC)
Lecture Hours: 45
Lab Hours: 54
Units: 3.50

COURSE DESCRIPTION
Prerequisite: None.

Digital logic concepts and their real-world application. Electrician identification, selection, and installation of electrical conductors in accordance with National Electrical Code (NEC). 45 hours lecture and 54 hours laboratory.

SHORT DESCRIPTION FOR CLASS SCHEDULE
Digital logic concepts and real-world application. Electrician identification, selection, and installation of electrical conductors in accordance with National Electrical Code (NEC)

ELE-45: Electrician Blueprint Reading with Code Applications for National Electrical Code (NEC)
Lecture Hours: 45
Lab Hours: 54
Units: 3.50

COURSE DESCRIPTION
Prerequisite: None.

Electrician studies of blueprints and specifications. Application of the National Electric Code will cover current protection, panel-boards, and lighting systems. 45 hours lecture and 54 hours laboratory.

SHORT DESCRIPTION FOR CLASS SCHEDULE
Electrician studies of blueprints and specifications. Application of the National Electric Code will cover current protection, panel-boards, and lighting systems.

ELE-46: Grounding Systems, Advanced Blueprints and Specifications, Motor Design and Installation, and National Electric Code

Lecture Hours: 45
Lab Hours: 54
Units: 3.50

COURSE DESCRIPTION
Prerequisite: None.

Advanced concepts for blueprints and specifications. Study of motor design and application and National Electric Code concepts.45 hours lecture and 54 hours laboratory.

SHORT DESCRIPTION FOR CLASS SCHEDULE
Advanced blueprint reading and specifications; Study of motor design, applications, with National Electric Code concepts.

ELE-47: Motor Control Principles, Generators and Power Supplies, with National Electric Code (NEC)
Lecture Hours: 45
Lab Hours: 54
Units: 3.50

COURSE DESCRIPTION
Prerequisite: None.

Techniques for controlling AC and DC motors; students examine conventional and cutting-edge technologies for power generation. 45 hours lecture and 54 hours laboratory.

SHORT DESCRIPTION FOR CLASS SCHEDULE
Controlling AC and DC motors, including conventional and cutting-edge technologies for power generation.

ELE-48: Transformer Theory, Leadership, Management, and Test Equipment

COURSE DESCRIPTION
Prerequisite: None.

Explores electrician theory and field application of transformers, test equipment, including management and leadership principles for supervisors, along with special equipment for security systems for the grid. 45 hours lecture and 54 hours laboratory.

SHORT DESCRIPTION FOR CLASS SCHEDULE
Electrician theory and the fielding of transformers, test equipment; includes management and leadership principles for supervisors, along with special equipment for grid security systems.

ELE-49: Electrician Specialty Systems
Lecture Hours: 45
Lab Hours: 54

Units: 3.50

COURSE DESCRIPTION
Prerequisite: None.

Examines specialty electrical systems commonly found in building construction. Includes fire alarm systems, closed-circuit television (CCTV) systems, telephone systems, cable television (CATV & MATV) systems, local area networks (LANs), fiber optic data systems, heating and air conditioning control systems, and lightning protection systems. 45 hours lecture and 54 hours laboratory.

SHORT DESCRIPTION FOR CLASS SCHEDULE
Specialty electrical systems common to building construction. Includes fire alarm, closed-circuit television (CCTV), telephone, cable television (CATV & MATV), local area networks (LANs), fiber-optic data, HVAC control, and lightning protection systems.

ITEM 4: Master Planning

The Electrician Apprenticeship program aligns with the master plan and mission of the college. The mission statement is as follows:

> *Norco College serves our students, our community, and its workforce by providing educational opportunities, celebrating diversity, and promoting collaboration. We encourage an inclusive, innovative approach to learning and the creative application of emerging technologies. We provide foundational skills and pathways to transfer, career and technical education, certificates and degrees.*

The Electrician Apprenticeship program aligns closely with the college's mission by providing educational opportunities to our community including continuing apprentices and those who will be joining the program. The program provides individuals with up-to-date knowledge of the electrical industry using a combination of hands on learning and traditional classroom activities. The five year program will lead to journeyman card, a certificate of achievement and a lifelong career for those enrolled.

The Electrician Apprenticeship program is designed to provide the residents of Riverside, San Bernardino, Mono and Inyo counties the opportunity to receive on the job training through the International Brotherhood of Electrical Workers. The five year apprenticeship program will allow students to earn a paycheck while they complete the required courses and hours.

With Norco College as the Lead Education Agency (LEA) for the Electrician Apprenticeship program students will have more access to complete an Associate's degree. Previously the LEA was located in San Diego. The distance made it difficult for apprentices to continue their education. The proximity of Norco College, and its sister colleges Moreno Valley College and Riverside City College, provides a broad area for the apprentices to take GE courses and complete an Associates of Science degree.

After successful completion of the program, the students will receive their journeyman card as an Electrician. This is a high paying field that is in demand. The required Electrician Apprenticeship courses, will also prepare students for a certificate, A.S. degree, or for transfer to a 4-year institution.

Norco College plans to reach out to Corona-Norco Unified School District, Moreno Valley Unified School District, and Riverside Unified School District to renew articulation agreements for electrical courses, and to inform them, in partnership with IBEW Local #440, about this new regional opportunity.

Once approved this program will be incorporated into the Program Review process. This process will review relevancy, curriculum outlines and student success on an annual basis. The process strategically aligns program review, strategic planning, and resource allocation aligning with accreditation standards. The responsibility for this program review will fall with the department chair and the Business, Engineering and Information Technology Division.

Item 5. Enrollment and Completer Projections

Norco College has not previously offered these courses and as such does not have historical enrollment data.

		2013-2014		2014-2015	
CB01: Course Department Number	**CB02: Course Title**	**Annual # Sections**	**Annual Enrollment Total**	**Annual # Sections**	**Annual Enrollment Total**
ELE 35	Introduction to the Electrical Trades and Construction Safety	N/A	N/A	N/A	N/A
ELE 41	Introduction to Electrical Theory, Basic Math Concepts, and the National Electric Code	N/A	N/A	N/A	N/A
ELE 42	Advanced DC Circuit Concepts, Introduction to 3-Phase AC Circuits, Test Equipment, and National Electric Code Applications	N/A	N/A	N/A	N/A
ELE 43	AC Circuit Concepts, Applied Electronics, and National Electric Code Applications	N/A	N/A	N/A	N/A
ELE 44	Digital Logic Circuits, Conductor Characteristics, Applications, and National Electric Code (NEC)	N/A	N/A	N/A	N/A
ELE 45	Electrician Blueprint Reading with Code Applications for National Electrical Code (NEC)	N/A	N/A	N/A	N/A
ELE 46	Grounding Systems, Advanced Blueprints and Specifications, Motor Design and Installation, and National Electric Code	N/A	N/A	N/A	N/A

ELE 47	Motor Control Principles, Generators and Power Supplies, with National Electric Code (NEC)	N/A	N/A	N/A	N/A
ELE 48	Transformer Theory, Leadership, Management, and Test Equipment	N/A	N/A	N/A	N/A
ELE 49	Electrician Specialty Systems	N/A	N/A	N/A	N/A

The chart below shows the total enrollment and annual completers of the program at Palomar College over the past four years. The International Brotherhood of Electrical Workers is expecting enrollment and completers to increase in the 2015-2016 year.

	2011-2012	2012-2013	2013-2014	2014-2015	Projected 2015-2016
Enrollees	470	475	450	417	420
Completers	90	29	43	*Expected June 2015	

The need for this program is supported by the net annual labor demand. It is projected that in 2016 there will be 3,950 jobs for electricians, 230 more than 2013. Of these jobs 350 will be replacements, bringing the total need to 580 electricians, or 193 openings per year.

Item 6. Place of Program in Curriculum/Similar Programs

a) *Do any active inventory records need to be made inactive or changed in connection with the approval of the proposed program? If yes, please specify.*

No, as this is a new apprenticeship program it will not affect existing programs.

b) *Does the program replace any existing program(s) on the college's inventory? Provide relevant details if this program is related to the termination or scaling down of another program(s).*

The program will not replace any existing program.

c) *What related programs are offered by the college?*

Norco College currently offers a digital electronics program. The program differs from the Electrician Apprenticeship program as it focuses on digital integrated circuit logic, analysis, design, mapping & simplification, microcontroller construction and programming, as well as printed Circuit Board (PCB) design from schematic capture and circuit simulations.

Item 7. Similar Programs at Other Colleges in Service Area

This program falls under TOP Code 0952.20. There is currently no other Electrician Apprenticeship program within the Inland Empire.

The only other program within the Inland Empire within this same TOP code is Barstow College's Residential Electrical certificate and AS degree program. Their certificate program is 21.5 units, with an AS degree option. It is not affiliated with a state approved apprenticeship program.

According to the CCCCO Data Mart Program Awards Summary Report, no data for Barstow College's Electrical program was found. In addition, given the geographical distance between colleges and the high labor market demand in the Inland Empire, there is no projected adverse effect by the creation of this program.

Supporting Documentation

Labor Market Information (LMI) Analysis

The growth within these counties will call for a higher number of individuals certified as electricians.

Labor Market Information & Analysis (CTE only)
Our regional Center of Excellence provided labor market data for our CTE Enhancement Fund applications (Source: QCEW Employees - EMSI 2014.2 Class of Worker). This report included SOC #47-2111, Electricians, indicating 193 total annual Job Openings (2013-2016) and documented a median living wage of $26.85.

SOC	Description	2013 Jobs	2016 Jobs	Change	% Change	Replacements	Openings	Annual Openings
47-2111	Electricians	3,720	3,950	230	6%	350	580	193