

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

Item 1. Program Goals and Objectives.

The new 30 unit Electrician certificate and AS degree was created out of a need in the Inland Empire for a program that prepares residents to become an entry-level Electrician Trainee and along with California state requirements prepares for careers as an Electrician, Electrical Apprentice, Electrician's Helper, Industrial Electrician, Journeyman Electrician, and Residential Electrician.

The Electrician program will provide students 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

Courses are aligned with California state standards to prepare students to earn their Electrician Trainee card (<http://www.dir.ca.gov/dlse/ecu/electricaltrainee.htm>). Norco College has been approved by the State of California, Department of Industrial Standards to offer the whole general electrician curriculum.

PROGRAM LEARNING OUTCOMES

Upon successful completion of this program, students should be able to:

- Plan, construct and explain safe and proper electrical circuits, using industry standard components, according to supplies blueprints and verbal instructions, while following National Electrical Code (NEC) and OSHA rule.
- Describe the general principles of direct or alternating current pertaining to a DC motor, AC motor, or Generator.
- Demonstrate bandaging and splinting techniques for the care of wounds, burns, sprains, dislocations and emergency rescue moves only when necessary.
- Troubleshoot and repair a given, complex configuration of electrical and electronic circuit combinations and create a written report of everything that was done to affect repairs, including necessary interactions with programmable devices.

ITEM 2. Catalog Description

Electrician

This program prepares residents to become an entry-level Electrician Trainee and along with California state requirements prepares for careers as an Electrician, Electrical Apprentice, Electrician's Helper, Industrial Electrician, Journeyman Electrician, and Residential Electrician. Courses are aligned with California state standards to prepare students to earn their Electrician Training card (<http://www.dir.ca.gov/dlse/ecu/electricaltrainee.htm>).

ITEM 3. Program Requirements

Requirements	Dept. Name/#	Name	Units	Sequence
Required Core (18 Units)	ELE 77	Survey of Electrical Trades	4	Yr 1, Fall
	MAN 55	Occupational Safety and Health Administration (OSHA) Standards for General Industry	2	Yr 1, Spring
	CON 62	Blueprint reading	3	Yr 2, Fall
	CON 60	Introduction to Construction	3	Yr 1, Fall
	CON 66	National Electric Code	3	Yr 2, Spring
	KIN 30	First Aid and CPR	3	Yr 1, Fall
Residential Construction Emphasis	ELE 71	Residential Wiring for Electricians	4	Yr 1, Spring
	ELE 73	Electric Motors for Electricians	4	Yr 2, Fall
	ELE 75	Electronics for Electricians	4	Yr 2, Spring
Industrial Plant Emphasis	ELE 64	Programmable Logic Controllers	4	Yr 1, Spring
	ELE 72	Commercial and Industrial Electrical	4	Yr 2, Fall
	ELE 74	Industrial Electrical Automation	4	Yr 2, Spring

Required Major Total: 30 Units

REQUIRED MAJOR COURSES

ELE-77: Survey of Electrical Trades

Same as: MAN- 77

Lecture Hours: 54

Lab Hours: 54

Units: 4.00

COURSE DESCRIPTION

Prerequisite: None.

An introduction to the ten primary electrical trades from residential, commercial and industrial jobs through to electrical specialties. Topics include basic electrical theory common to all electricians, such as: voltage, resistance, current, power, capacitance, inductance, reactance, impedance, blueprint symbols, Ohm's Law, Power Law, Power-factor, using instrumentation, interpreting measurements, wire gauges, ampacity, circuit protection, shorts, opens, troubleshooting and safety. Examines electrical trades opportunities and responsibilities along with an overview of NEC and OSHA basics.

54 hours lecture and 54 hours laboratory. (Letter Grade or Pass/No Pass option.)

SHORT DESCRIPTION FOR CLASS SCHEDULE

Introduces students to opportunities and responsibilities in ten primary electrical trades. (Same as MAN-77)

MAN55: Occupational Safety and Health Administration (OSHA) Standards for General Industry

Lecture Hours: 36

Lab Hours: 0

Units: 2.00

COURSE DESCRIPTION

Prerequisite: None.

Covers OSHA policies, procedures, and standards, as well as safety for general industry and health principles. Topics include scope and application of the OSHA general industry standards. Special emphasis is placed on those areas that are the most hazardous, using OSHA standards as a guide. Upon successful course completion, the student will receive either an OSHA 10 or 30 hour general industry or construction industry training completion card. 36 hours lecture. (Letter Grade, or Pass/No Pass option.)

SHORT DESCRIPTION FOR CLASS SCHEDULE

OSHA policies, procedures, and standards, as well as safety for general industry and health principles. Topics include scope and application of the OSHA for general industry.

CON-62: Blueprint Reading

Lecture Hours: 54

Lab Hours: 0

Units: 3.00

COURSE DESCRIPTION

Prerequisite: None.

This course will provide an overview of construction blueprint and specification reading, the relationship of drawings and specifications to the contract and responsibilities of the inspector in interpreting the contract documents and in the inspection of the work. 54 hours lecture.

SHORT DESCRIPTION FOR CLASS SCHEDULE

This course will provide an overview of the basic concepts of reading construction blueprints.

CON-60: Introduction to Construction

Lecture Hours: 54

Lab Hours: 0

Units: 3.00

COURSE DESCRIPTION

Prerequisite: None.

This course will provide an overview of the basic concepts of construction, including city and regional planning, managing, contracting, designing, engineering, estimating, bidding, inspection and production work normally associated with construction. An overview of how building codes affect the design, materials and methods of constructing buildings and other projects. Students will be expected to participate in several field trips. 54 hours lecture.

SHORT DESCRIPTION FOR CLASS SCHEDULE

This course will provide an overview of the basic concepts of the construction process.

CON-66: National Electrical Code

Lecture Hours: 54

Lab Hours: 0

Units: 3.00

COURSE DESCRIPTION

Prerequisite: None.

Review of electrical codes including discussion and analysis of the application of physical laws in development of the code requirements. 54 hours lecture.

SHORT DESCRIPTION FOR CLASS SCHEDULE

This course will provide an analysis of the regulations found in the National Electric Code.

KIN30: First Aid and CPR

Lecture Hours: 54

Lab Hours: 0

Units: 3.00

COURSE DESCRIPTION

Prerequisite: None.

This course involves the theory and detailed demonstration of first aid care of the injured by the citizen responder. Students will learn how to assess a victim's condition and incorporate proper treatment. Students who successfully pass all National Safety Council requirements will receive a National Safety Council Advanced First Aid certificate. Students who successfully pass all American Heart Association requirements will receive a Healthcare Professional CPR certificate. 54 hours lecture. A fee of \$20.00 for required certificates will be charged to the student and is not covered by BOGW.

SHORT DESCRIPTION FOR CLASS SCHEDULE

Earn "National Safety Council Advanced First Aid" and "American Heart Association Healthcare Professional" certificates. First Aid and CPR fees totaling \$20.00 will be charged to the student and are not covered by BOGW. Drop deadlines for nonpayment apply.

Residential Construction Emphasis**ELE-71: Residential Wiring for Electricians**

Lecture Hours: 54

Lab Hours: 54

Units: 4.00

COURSE DESCRIPTION

Prerequisite: None.

Explores the foundations of electrical wiring for residential dwellings. Topics include residential requirements and practices with commercial and industrial applications. Laboratory allows students to wire and test sample wall and ceiling sections. 54 hours lecture and 54 hours laboratory. (Letter Grade, or Pass/No Pass option)

SHORT DESCRIPTION FOR CLASS SCHEDULE

The foundations of electrical wiring for residential dwellings.

ELE-73: Electric Motors for Electricians

Same as: MAN- 73

Lecture Hours: 54

Lab Hours: 54

Units: 4.00

COURSE DESCRIPTION

Prerequisite: None.

Enables electricians to understand and effectively wire most standard DC motors, servos and steppers, as well as many AC motors, including single and poly-phase units, from fractional horsepower to multi-horsepower, industrial giants. 54 hours lecture and 54 hours laboratory. (Letter Grade, or Pass/No Pass option.)

SHORT DESCRIPTION FOR CLASS SCHEDULE

Prepares workers to plan, wire, measure and troubleshoot most standard motor types, with selected hands-on lab experiences. (Same as MAN-73)

ELE-75: Electronics for Electricians

Lecture Hours: 54

Lab Hours: 54

Units: 4.00

COURSE DESCRIPTION

Prerequisite: None.

Enables electricians to integrate electronic devices into electrical systems for greater efficiency, flexibility and competitive advantage. 54 hours lecture and 54 hours laboratory. (Letter Grade, or Pass/No Pass option.)

SHORT DESCRIPTION FOR CLASS SCHEDULE

Learn to integrate electronic devices into electrical systems for greater efficiency, flexibility and competitive advantage.

Industrial Plant Emphasis

ELE-64: Programmable Logic Controllers

Same as: MAN- 64

Lecture Hours: 36

Lab Hours: 54

Units: 3.00

COURSE DESCRIPTION

Prerequisite(s): None.

Advisory: ELE 10 or ELE 21

Fundamentals of programmable logic controllers, with an emphasis on introductory programming of

PLCs. Problem analysis with solutions that integrate programming formats, auxiliary commands and functions, common programming languages, and popular software programs used with PLCs. Installation, maintenance, troubleshooting and repair are inherent components. 36 hours lecture and 54 hours laboratory. (Letter Grade, or Pass/No Pass option.)

SHORT DESCRIPTION FOR CLASS SCHEDULE

Fundamentals of programmable logic controllers. Programming, installation, maintenance, troubleshooting and repair of PLC systems. (Same as MAN-64)

ELE-72: Commercial and Industrial Electrical

Same as: MAN- 72

Lecture Hours: 54

Lab Hours: 54

Units: 4.00

COURSE DESCRIPTION

Prerequisite: None.

Focuses on the wiring of commercial and industrial buildings that use metal or concrete walls. The National Electrical Code will be stressed at it relates to grounding, soil conditions, conduits, raceways, cable-trays, fills, line/load wiring, circuit/motor protection, de-rating, tension, wire-splicing, control/power transformers, pipe-bending/supporting, lighting distribution/layout, and special considerations. Hands-on lab experiences are selected to reinforce key theories. 54 hours lecture and 54 hours laboratory. (Letter Grade, or Pass/No Pass option)

SHORT DESCRIPTION FOR CLASS SCHEDULE

Wiring commercial and industrial buildings that use metal or concrete walls. (Same as MAN-72)

ELE-74: Industrial Electrical Automation

Same as: MAN- 74

Lecture Hours: 54

Lab Hours: 54

Units: 4.00

COURSE DESCRIPTION

Prerequisite: None.

Automatic monitoring, control and communications for electrical systems used with various motors; pneumatics/hydraulics basics; machines/processes control; production-lines; machine-vision; QC-inspection; palletizing; robotics; inventory transport, storage, distribution and reporting control systems. Topics include open-loop vs closed-loop control with feedback; PID; A/D and D/A conversion; remote-sensing/control and programming PLCs/PACs; networking; RFID and bar-codes are also discussed. 54 hours lecture and 54 hours laboratory. (Letter Grade or Pass/No Pass option)

SHORT DESCRIPTION FOR CLASS SCHEDULE

Automatic monitoring, control and communications of electrical systems for automation of processes, machines and factories. (Same as MAN-74)

ITEM 4: Master Planning

The Electrician 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 program aligns closely with the college’s mission by providing educational opportunities to our community. The program provides individuals with up-to-date knowledge of the electrical industry using a combination of hands on learning and traditional classroom activities. Students may register with the State of California, Department of Industrial Relations to obtain their Electrician Trainee card.

This card will allow students to legally work for a C-10 electrical contractor in the State of California if they have not already passed the state exam or are enrolled in a federally approved apprenticeship program. Registering for the electrical trainee card will allow students to obtain gainful employment while continuing their education.

After successful completion of the Electrician program, and the state mandated on the job hours (4,800 for residential electrician, 4,000 for Fire/Life Safety Technician, 4,000 for Voice Data Video Technician, and 2,000 for Non-Residential Lighting Technician) students will be eligible to apply for the State Electrical Certification Exam. Will a successful passing grade students will receive their journeyman card as an Electrician. This is a high paying field that is in demand. The required Electrician 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.

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

CB01: Course Department Number	CB02: Course Title	2013-2014		2014-2015	
		Annual # Sections	Annual Enrollment Total	Annual # Sections	Annual Enrollment Total
ELE 77	Survey of Electrical Trades	N/A		N/A	
MAN 55	Occupational Safety and Health Administration (OSHA) Standards for General Industry	1	17	1	21
CON 62	Blueprint reading	3	60	4	92

CON 60	Introduction to Construction	1	27	1	18
CON 66	National Electric Code	1	35	1	36
KIN 30	First Aid and CPR	6	230	5	177
ELE 71	Residential Wiring for Electricians	N/A		N/A	
ELE 73	Electric Motors for Electricians	N/A		N/A	
ELE 75	Electronics for Electricians	N/A		N/A	
ELE 64	Programmable Logic Controllers	1	22	1	23
ELE 72	Commercial and Industrial Electrical	N/A		N/A	
ELE 74	Industrial Electrical Automation	N/A		N/A	

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, while this is a new program it is actually a subset of existing State Approved programs that are currently being taught at Norco College.

- 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. In the “Catalog Rights” section of the Norco College 2014-2015 Catalog, it states that students may choose to have classes applied under new or older programs, assuming continuous enrollment. So, it is logical to assume that some students, who already have taken qualifying courses, that will be in the new Electrician Program, once approved, may wish to have those courses applied toward the new program. Therefore, we stated on the cover page of this application that the program has already started, in accordance explicit instructions within the CCC-501 Handbook.

- 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.

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. 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.

Chaffey College offers an Industrial Electrical Technology program, our program is for Electrician and offers an emphasis in Industrial Plant. Chaffey's program will focus on electronics while our program prepares students for a career as an electrician.

San Bernardino Valley College (SBVC) offers several electrical and electronics programs. The curriculum prepares students for trainee positions in maintenance, installation, field service, networking, in the area of specialization. Our program will focus on residential electrician and industrial plant technician.

We do not believe that Norco Electronics will adversely impact any Region 9 institution or program. However, it will benefit Norco College students, many of whom already commute great distances to attend Norco. This is particularly true for those who commute from the south and the east of Norco College. Many of our students come from such places as the Lake Elsinore and San Jacinto areas to study with us. We have even suggested that some of these students might be well served by SBVC and their complete electrical and electronics programs that also focus on telecommunications and avionics. These students have told us that they already travel too great a distance, just to get to Norco College, as it is. They are unwilling to drive farther.

Supporting Documentation

1. 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

2. Advisory Committee Recommendations

List of Members of Advisory Committee

Name:	Title:	Organization:	Location:
Michael Davidson	Clinical Manager for the Department of Orthotics	Loma Linda University	Loma Linda, CA
Hans Schaepper	Instructor, Student Liaison	Loma Linda University	Loma Linda, CA
Edd Ashley	Chair, Department of Physical Therapy	Loma Linda University	Loma Linda, CA
Nita Leighton	CFO	NPD Corp	Riverside, CA
Alfonso Esparza	Human Resources Specialist	The Home Depot RDC	Ontario, CA
Pat Uetz	Sales Specialist	Advanced Technologies	Murrieta, CA
Rick Pettit	Human Resources Specialist	California Steel Industries	Fontana, CA
Laura Ochoa	Owner	Val Electric Inc.	Ontario, CA
Raj Panjabi	Technology Education Consultant	Raneco Technical Training	Irvine, CA
Michael Gook	Engineering and Facilities Senior Group Leader	Target Corporation	Fontana, CA
Kimani Stair	Controls Engineer	Target Corporation	Fontana, CA
Albert Trujilo	Systems Engineer and Engineering	Target Corporation	Fontana, CA
Rick Simmons	Owner	Simmons Electric	
Roland Bomar	Department Manager	POWER Testing and Energization, Inc	Riverside, CA

May 2nd, 2014

Corona, CA

Electrician Program

- Professor Graham brought into discussion the new program at Norco College that they are implementing: Hierarchy of new electrician courses and locally approved certificates.
- Professor Graham asked Industry who would like to see electrician training brought to Norco College 12 out of 14 raised their hands.
- We need to revise student learning outcomes so they are more realistic for students in ELE 10, ELE 26, ELE 25, ELE 28 the vote was unanimous.
- There is a need to make ELE 26 so that it isn't built around a single brand and isn't proprietary. Move away from Pic and towards Arduino because it is open source. It is written in C. We need to teach student C language. Wire wrapping and soldering is not very good to get the students to create. We have to exclude microprocessors because they have become so complex that it is not capable to teach it in depth enough; make it only micro controllers. The vote was

unanimous. ELE 11 and 13 would transfer to Cal Poly Pomona so they wouldn't have to take the class there. Only the core classes transfer.

- Industry needs recruitment from Norco College; they need technicians. 6 months of training that can be use right away. Arduino and C is sustainable to teach students because it also reduces financial strain.
- We need to implement the Electrician program.
- Don't get rid of analog.
- They're excited about the programs that Norco College has in regards to supply chain technology and the hands on components available for the students. They also included the Engineering and manufacturing as well. They believe having hands on components will enable the students not get lost when they go out into industry.
- They are excited about Norco College implementing the Electrician courses and believe it will be an asset to students and the industry as a whole.
- Do you have capstone class? Yes we do in the ELE 26 and 28. ELE 28 is a really great capstone class allowing students to create and design PCB boards. ELE 26 allows you to work with programming and gives you an overall understanding of how the circuitry works.
- Electronics is crucial in all fields of industry. Loma Linda offered gratitude for Norco College and what they are offering the students. What they are learning in Electronics can serve them well in industry. Example Loma Linda has 4.00 students that are dealing with building prosthetics and they get thrown for a loop electronically. So what Norco College is offering students is appreciated and crucial for the future of students.
- Being able to combine programming, mechanical, electronic, and other logistical concepts in capstone classes is essential.
- ELE 26 students are given a problem and then directed to come up with their own ideas to solve it via electronically and mechanically. Even trouble shooting it if necessary which really allows students to be creative and enhance their skills.
- If you want to see all the students and what they have created there are some videos on classjump.com under Glen Graham.
- Can we implement more mechanical course that emphasize the well rounded mechanics not just electrical.