

ELECTRICAL TECHNOLOGY

Curriculum Guide for Academic Year 2015-2016

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Students planning to **transfer** to a four-year college or university should refer to the ASSIST web site at <http://www.assist.org> and **consult a counselor** before beginning a program of study. Please call 562-938-4561 for the LAC, or (562) 938-3920 for PCC to schedule a meeting with a counselor. Students may also wish to visit the Transfer Center on either campus.

Program Admission Requirements

Students are required to complete the following *Registration Steps* for admission into the Electrical Technology Program: For online links to the steps below and a current list of all Electrical Department Orientation dates go to <http://www.lbcc.edu/Electrical>

Registration Steps:

1. Make sure you have a valid email address.
2. Every student is required to have a student ID before they can register in classes. This process can take place at any time. Apply to LBCC at Admissions and Records. <http://www.lbcc.edu/Admissions/>
3. The following day after you complete your application, you will receive an e-mail from Enrollment Services with your LBCC Student ID# and instructions on how to obtain your password.
4. All students are required to complete the Assessment and Orientation process before they will be allowed to register for any classes. Visit the Assessment and Orientation Page. <http://www.lbcc.edu/Assessment/>
5. Sign up for assessment and orientation at Assessment and Orientation Signup and complete both processes. This is a onetime process.
6. Sign up online for the Electrical Program Orientation Session. New students must attend one. See the list of dates and sign up information on the department website at <http://www.lbcc.edu/Electrical>
7. Attend the Electrical Department Orientation Meeting.
8. To register for any electrical courses you must attend an Electrical Program Orientation Meeting
Notice: Students enrolled in the Sheet Metal or other non-electrical trade programs who would like to enroll in Elect 202 do not need to attend an Electrical Orientation. Please refer to the Electrical Program website for additional information <http://www.lbcc.edu/Electrical>
9. Register for electrical classes after attending the orientation meeting.

ELECTRICAL ORIENTATION:

At the Electrical Orientation, students will be provided with

- An overview of the program

- Program Safety Requirements and Expectations – Description of the classes and recommended course sequence.
- Requirements for the certificate and degree
- Assistance in selecting the appropriate electrical math classes.
- Course substitution process for any electrical or math classes completed at other regionally accredited institutions.

At the orientation meeting, all students will be required to complete a 50 question on-line electrical math test. Students should bring a calculator for use during the test.

Any student who has completed a college math class should bring an unofficial transcript from a regionally accredited institution of that class for evaluation at the orientation meeting.

Any student, who has completed electrical classes elsewhere, should bring an unofficial transcript from a regionally accredited institution for evaluation at the orientation meeting.

Checklist for the Electrical Orientation Session

- Arrive 15 minutes prior to the start time. A one day parking permit is required on campus. There is no off campus parking or metered parking. There are permit dispensers in the parking lots. See the campus map for the location of the permit dispensers.
- Bring your student ID number.
- Bring a copy of unofficial transcripts for any college math class from a regionally accredited institution.
- Bring a copy of unofficial transcripts for any college electrical classes from a regionally accredited institution.
- Bring a working calculator.

ADDITIONAL ELECTRICAL DEPARTMENT REQUIREMENTS:

1. To accommodate changes in employment, students will be allowed to switch from day or evening programs with instructor and Department Head approvals. Switching between day and night programs can be accommodated between semesters.
- 2.
3. This program recommends a minimum qualification from the assessment testing for ENGL 801A and READ 881.
4. Electrical Code Classes are not to be taken prior to completion of ELECT 204 or ELECT 200A.
5. A valid CPR card or concurrent registration in a CPR class is suggested while enrolled in Electricity courses.

**Program of study leading to:
Associate in Science (A.S.) Degree**

DAY PROGRAM

The following sequence of classes is the order recommended for day students. The length of time to complete the program will depend upon how many classes the student takes each semester. Electives may be taken anywhere in the sequence as long as the prerequisites for the course have been met.

| <u>REQUIRED COURSES (listed below in recommended sequence)</u> | | | UNITS | In Progress | Completed Grade |
|---|------------|---|--------------|--------------------|------------------------|
| | ELECT 253 | OSHA Standards for Construction Safety | 2 | | |
| | ELECT 202 | Electrical Mathematics | 3 | | |
| † | ELECT 200A | First Semester Industrial Electricity | 6.5 | | |
| † | ELECT 225 | Algebra and Trigonometry for Electricians | 4 | | |
| † | ELECT 200B | Second Semester Industrial Electricity | 8 | | |
| † | ELECT 200C | Third Semester Industrial Electricity | 8 | | |
| † | ELECT 435A | Electrical Motor Control 1 | 2 | | |
| † | ELECT 200D | Fourth Semester Industrial Electricity | 8 | | |
| Subtotal Units | | | 41.5 | | |

Associate Degree requirements continued from the previous page:

| <u>IN ADDITION, complete 3.5 UNITS from the following courses:</u> | | | UNITS | | |
|---|-----------|---|--------------|--|--|
| | CISCO 250 | Communications Cabling Installation | 3 | | |
| | CISCO 251 | Introduction to Networking | 3 | | |
| | ELECT 41 | Technical Applications of Minicomputers | 2 | | |
| † | ELECT 226 | Solid State Fundamentals for Electricians | 3 | | |

| | | | | | |
|---|------------|--|------------|--|--|
| † | ELECT 227 | D.C. and A.C. Variable Speed Drives | 3 | | |
| | ELECT 230A | Robotics Technology-Design | 3 | | |
| | ELECT 230B | Robotics Technology-Integration | 3 | | |
| | ELECT 230C | Robotics Technology-Applications | 3 | | |
| † | ELECT 242 | Electrical Code – Grounding | 1.5 | | |
| | ELECT 261 | Introduction to Renewable Energy | 3 | | |
| † | ELECT 262 | Solar 1 – Grid-Tied Solar Photovoltaics | 3 | | |
| † | ELECT 263 | Solar 2 – Advanced Solar Photovoltaics | 3 | | |
| | ELECT 271 | Electrical Cost Estimating | 3 | | |
| | ELECT 275 | Electrical Pipe Bending (A) | 0.5 | | |
| † | ELECT 276 | Electrical Pipe Bending (B) | 0.5 | | |
| † | ELECT 277 | Blueprint Reading for Electricians | 3 | | |
| | ELECT 280 | Traffic Signal Systems 1 | 3 | | |
| † | ELECT 284 | Traffic Signal Controllers & Digital Systems | 3 | | |
| † | ELECT 435B | Electrical Motor Control 2 | 2 | | |
| | | Subtotal Units | 3.5 | | |
| | | TOTAL UNITS | 45 | | |

For both the Day and Night programs, the following is **REQUIRED** for the **NATURAL SCIENCES** requirement:
Complete any one course (3 units minimum) appearing on the current CSU-GE Breadth List (Plan B) in areas B1, B2, or B2.

NIGHT PROGRAM

The following sequence of classes is the order recommended for night students. The length of time to complete the program will depend upon how many classes the student takes each semester. Electives may be taken anywhere in the sequence as long as the prerequisites for the course have been met.

| REQUIRED COURSES (listed below in recommended sequence) | | | UNITS | In Progress | Completed Grade |
|--|------------|--|--------------|--------------------|------------------------|
| | ELECT 253 | OSHA Standards for Construction Safety | 2 | | |
| | ELECT 202 | Electrical Mathematics | 3 | | |
| † | ELECT 204 | First Semester Fundamentals of D.C. | 3 | | |
| † | ELECT 210A | Laboratory Practices 1 | 1 | | |
| | | <i>(204 & 210A must be taken concurrently)</i> | | | |
| † | ELECT 225 | Algebra & Trigonometry for Technicians | 4 | | |
| † | ELECT 209 | Second Semester Fundamentals of Motors/Generators | 3 | | |
| † | ELECT 210B | Laboratory Practices 2 | 1 | | |
| | | <i>(209 & 210B must be taken concurrently)</i> | | | |
| † | ELECT 240 | Electrical Code - Residential | 3 | | |
| † | ELECT 212 | Third Semester Fundamentals of AC Electricity | 3 | | |
| † | ELECT 210C | Laboratory Practices 3 | 1 | | |
| | | <i>(212 & 210C must be taken concurrently)</i> | | | |
| † | ELECT 435A | Electric Motor Control 1 | 2 | | |
| † | ELECT 214 | Fourth Semester AC Principles and Pract | 3 | | |
| † | ELECT 210D | Laboratory Practices 4 | 1 | | |
| | | <i>(214 & 210D must be taken concurrently)</i> | | | |
| † | ELECT 245 | Electrical Code – Commercial | 3 | | |
| † | ELECT 250 | Electrical Code – Industrial | 3 | | |
| † | ELECT 242 | Electrical Code – Grounding | 1.5 | | |
| | | Subtotal Units | 37.5 | | |

Associated Degree requirements continue on the following page:

Associated Degree requirements continue from the previous page: **IN ADDITION, complete SEVEN & ONE HALF (7.5) UNITS from the following courses:**

| | | | UNITS | | |
|---|------------|---|--------------|--|--|
| | CISCO 250 | Network Cabling Installation | 3 | | |
| | CISCO 251 | Introduction to Networking | 3 | | |
| | ELECT 41 | Technical Applications of Minicomputers | 2 | | |
| † | ELECT 226 | Solid State Fundamentals for Electricians | 3 | | |
| † | ELECT 227 | D.C. and A.C. Variable Speed Drives | 3 | | |
| | ELECT 230A | Robotics Technology-Design | 3 | | |
| | ELECT 230B | Robotics Technology-Integration | 3 | | |
| | ELECT 230C | Robotics Technology-Applications | 3 | | |
| | ELECT 261 | Introduction to Renewable Energy | 3 | | |
| † | ELECT 262 | Solar 1 – Grid-Tied Solar Photovoltaics | 3 | | |

| | | | | | |
|---|------------|--|-----------------------|------------|--|
| † | ELECT 263 | Solar – Advanced Solar Photovoltaics | 3 | | |
| † | ELECT 271 | Electrical Cost Estimating | 3 | | |
| | ELECT 275 | Electrical Pipe Bending (A) | 0.5 | | |
| † | ELECT 276 | Electrical Pipe Bending (B) | 0.5 | | |
| † | ELECT 277 | Blueprint Reading for Electricians | 3 | | |
| | ELECT 280 | Traffic Signal Systems 1 | 3 | | |
| † | ELECT 284 | Traffic Signal Controllers & Digital Systems | 3 | | |
| † | ELECT 435B | Electrical Motor Control 2 | 2 | | |
| | | | Subtotal Units | 7.5 | |
| | | | TOTAL UNITS | 45 | |

For both the Day and Night programs, the following is **REQUIRED for the NATURAL SCIENCES** requirement:
Complete any one course (3 units minimum) appearing on the current CSU-GE Breadth List (Plan B) in areas B1, B2, or B2.

Math courses listed under the General Education Pattern for CSU Transfers (Plan B) will be accepted as a substitute for the field of concentration courses in the event the college cancels, or does not offer classes required by the field of concentration. To qualify for this option the student must have been continuously enrolled as defined by college policy, as shown in the catalog.

For graduation with an **§Associate in Science (A.S.) Degree with a major in Electrical Technology:**

- Minimum Unit Requirements:** Any course that appears on a curriculum guide and the General Education Pattern (Plan A) may fulfill both major and general education requirements (Approved by College Curriculum Committee Spring 2012). For this degree, complete a minimum of 60 units in courses numbered 1-599. Please note that additional elective units may be required to meet this minimum based upon courses selected to fulfill General Education for the Associate Degree.

| | |
|-------------------------------------|----------|
| Electrical Technology Major: | 45 units |
| General Education/A.S. § | 19 units |

- Scholarship:** Maintain an overall grade point average (GPA) of 2.0 ("C" average) based on all accredited college work applied to the degree, no matter where completed. For this field of concentration, complete each course above with a grade of "C" or better, or "P" if course is graded on a P/NP basis.
- Residence for the Degree:** Complete at least 30 units of the required 60 in residence at LBCC, or complete in residence at LBCC at least 20 units within the last 30 units of work applied to the degree.
- Residence for the Field of Concentration:** Complete fifty percent (50%) or more of the unit requirements for this field of concentration in residence; this means at least 23 units of the required 45 must be completed at Long Beach City College. Credit earned by exam, where applicable, may be included.
- General Education and Proficiency Requirements:** Complete the required A.A./A.S. General Education and Proficiency requirements*, otherwise known as "Plan A". For Plan A requirements, refer to the general catalog or view it online at <http://osca.lbcc.edu>.
- Complete and submit the degree application form to the Admissions and Records office during your final semester of course work. These forms are available in the Admissions and Records office, or online at <http://admissions.lbcc.edu/>. Refer to the Schedule of Classes (<http://schedule.lbcc.edu>) and click the "Important Dates" link to view the actual deadline for each semester.

*The requirements for general education/proficiency and the field of concentration (major) need to be from the same catalog year. This catalog year may be any year between the year of initial enrollment to the present, provided continuous enrollment is maintained throughout. See the catalog for definition of "continuous enrollment".

Other Program Information

Any elective class on this curriculum guide may be used to satisfy elective credits for any prior year curriculum guide. Math courses listed under the General Education Pattern for CSU Transfers (Plan B) will be accepted as a substitute for the field of concentration courses in the event the college cancels or does not offer classes required by the field of concentration. To qualify for this option this student must have been continuously enrolled as defined by college policy, as shown in the catalog

Program of study leading to: **Certificate of Achievement**

REQUIRED COURSES—Complete the 45 units of required courses as listed in the Associate Degree requirements box on the preceding pages.

REQUIRED COURSES

In
Progress Completed

For graduation with a **Electrical Technology Certificate of Achievement**:

1. Complete each of the **REQUIRED COURSES** listed above with a **minimum grade of "C"** or better, or P if the course is grade on a P/NP basis.
2. Complete fifty percent (50%) or more of the unit requirements for this field of concentration in residence; this means at **least 22.5 units** of the required 45 must be **completed at Long Beach City College**. Credit earned by exam, where applicable, may be included.
3. Complete and submit the certificate application form to the Admissions and Records office during your final semester of course work. These forms are available in the Admissions and Records office, or online at <http://admissions.lbcc.edu/> . Refer to the Schedule of Classes (<http://schedule.lbcc.edu>) and click the "Important Dates" link to view the actual deadline for each semester

For both the **Associate in Arts** and the **Certificate of Achievement**, the following courses are recommended, **BUT ARE NOT REQUIRED** to earn either.

RECOMMENDED but not required courses:

| | | | |
|----------|---|---|---|
| LEARN 11 | Learning & Academic Strategies | 2 | <table border="1" style="width: 100%; height: 20px;"></table> |
| ELECT 41 | Technical Applications of Minicomputers | 2 | <table border="1" style="width: 100%; height: 20px;"></table> |

**Program of study leading to:
Certificates of Accomplishment**

Certificate: Network Cabling Specialist 4089

| <u>REQUIRED COURSES</u> | | UNITS | In Progress | Completed Grade |
|-------------------------|------------------------------|----------|---|---|
| CISCO 250 | Network Cabling Installation | 3 | <table border="1" style="width: 50px; height: 20px;"></table> | <table border="1" style="width: 50px; height: 20px;"></table> |
| TOTAL UNITS | | 3 | <table border="1" style="width: 50px; height: 20px;"></table> | <table border="1" style="width: 50px; height: 20px;"></table> |

Certificate: Network Installation 4090

| <u>REQUIRED COURSES</u> | | UNITS | In Progress | Completed Grade |
|-------------------------|------------------------------|----------|---|---|
| CISCO 250 | Network Cabling Installation | 3 | <table border="1" style="width: 50px; height: 20px;"></table> | <table border="1" style="width: 50px; height: 20px;"></table> |
| CISCO 251 | Introduction to Networking | 3 | <table border="1" style="width: 50px; height: 20px;"></table> | <table border="1" style="width: 50px; height: 20px;"></table> |
| TOTAL UNITS | | 6 | <table border="1" style="width: 50px; height: 20px;"></table> | <table border="1" style="width: 50px; height: 20px;"></table> |

Certificate: Network Installation and Design 4091

| <u>REQUIRED COURSES</u> | | UNITS | In Progress | Completed Grade |
|-------------------------|------------------------------|-----------|---|---|
| CISCO 250 | Network Cabling Installation | 3 | <table border="1" style="width: 50px; height: 20px;"></table> | <table border="1" style="width: 50px; height: 20px;"></table> |
| CISCO 251 | Introduction to Networking | 3 | <table border="1" style="width: 50px; height: 20px;"></table> | <table border="1" style="width: 50px; height: 20px;"></table> |
| CISCO 252 | Routing and Access Control | 3 | <table border="1" style="width: 50px; height: 20px;"></table> | <table border="1" style="width: 50px; height: 20px;"></table> |
| CISCO 253 | Cisco Networking III, LAN | 3 | <table border="1" style="width: 50px; height: 20px;"></table> | <table border="1" style="width: 50px; height: 20px;"></table> |
| TOTAL UNITS | | 12 | <table border="1" style="width: 50px; height: 20px;"></table> | <table border="1" style="width: 50px; height: 20px;"></table> |

Certificate: Traffic Signals Systems 1 4029

| <u>REQUIRED COURSES</u> | | UNITS | In Progress | Completed Grade |
|-------------------------|--|----------|---|---|
| ELECT 280 | Traffic Signals Systems 1 | 3 | <table border="1" style="width: 50px; height: 20px;"></table> | <table border="1" style="width: 50px; height: 20px;"></table> |
| ELECT 284 | Traffic Signal Controllers & Digital Systems | 3 | <table border="1" style="width: 50px; height: 20px;"></table> | <table border="1" style="width: 50px; height: 20px;"></table> |
| TOTAL UNITS | | 6 | <table border="1" style="width: 50px; height: 20px;"></table> | <table border="1" style="width: 50px; height: 20px;"></table> |

Certificate: Solar Photovoltaic Installation and Design 4920

| <u>REQUIRED COURSES</u> | | UNITS | In Progress | Completed Grade |
|-------------------------|--|----------|-------------|-----------------|
| ELECT 261 | Introduction to Renewable Energy | 3 | | |
| ELECT 262 | Solar 1 – Grid-Tied Solar Photovoltaic | 3 | | |
| ELECT 263 | Solar 2 – Advanced Solar Photovoltaic | 3 | | |
| TOTAL UNITS | | 9 | | |

For graduation with a **Certificate of Accomplishment**:

1. Complete the above required units with a minimum grade point average of 2.0 (“C” average).
2. Fifty percent (50%) or more of the required units must be completed in residence at LBCC.
3. Complete and submit the certificate application form to the Admissions and Records office during your final semester of course work. These forms are available in the Admissions and Records office, or online at <http://admissions.lbcc.edu/>.

Career Opportunities

Students prepare for entry-level employment in numerous electrical and electrically related trades. Upon completion of the Electrical Technology program, the student will be able to install, maintain, and repair electrical equipment and systems in a safe and workmanlike manner. The California Contractor’s License requirements recognize the courses listed below as partial fulfillment of the experience requirements. This program also meets the standards set by the California Department of Apprenticeship Standards towards the current California Electrician Certification testing. Once a student has completed the program, that student will be allowed to register to take the Electrician’s Certification Exam.

California Division of Apprenticeship Standards Approved School: #101

Program Mission, Outcomes and Student Learning Outcomes

Mission:

- The mission of the Electrical Department is to educate its students in all areas of Industrial Electrical Technology in response to the needs of industry National Electrical Code standards.

Outcomes:

- Analyze different types of power distribution systems and apply these systems in a design environment.
- Design commercial building blueprint design project applying motor, transformer, power distribution; short-circuit calculations, and lighting systems meeting all the requirements of the National Electrical Code.
- Design and evaluate control system programs for the operation of automation systems, including timing, counting, sequential and process control operations.

Requisite:

- **Limitation on Enrollment. New students must attend an Electrical Orientation prior to enrollment.**
 - See a list of dates and sign up information on the program website at <http://www.lbcc.edu/electrical>
- The program requisite is in place to ensure the safety and health awareness of LBCC electrical students.

Legend

% This course requires a permission number and completion of the Electrical Department orientation process.

† This course has a prerequisite. Prerequisite courses must be complete with at least a “C” or “P” grade. Refer to the General Catalog (<http://www.lbcc.edu/cat/index.html>), the Schedule of Classes (<http://schedule.lbcc.edu/>), or the online Credit Course Outline (<http://wdb-asir.lbcc.edu/coursecurriculum/coursedetails/>) for specific prerequisite information.