

# ELECTRICAL TECHNOLOGY

## LONG BEACH CITY COLLEGE

### Curriculum Guide for the Academic Year of 2009-2010

#### Certificate of Achievement and/or Associate in Science or Certificate of Accomplishment

ALL THE INFORMATION CONTAINED HEREIN IS SUBJECT TO CHANGE WITHOUT NOTICE.

For possible updates to this guide please refer to the following website: <http://osca.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**

#### DEPARTMENTAL ADMISSION REQUIREMENTS

While there are no requirements for admission, the department recommends the following.

1. Completion of the Math, English and Reading Assessment testing prior to enrollment. To schedule an assessment test call 562-938-4049
2. For students enrolled in the night program, the successful completion of ELECT 202 Electrical Mathematics prior to enrollment in ELECT 204 is recommended. If that is not possible, then the student *must* be concurrently enrolled in ELECT 202, ELECT 204 and ELECT 210A for the first semester in the Electrical Program. Students have the option to obtain credit by exam for ELECT 202 Electrical Mathematics. Students may also apply college Algebra and Trigonometry classes for credit in ELECT 202 and/or ELECT 225.
3. To accommodate changes in employment, students will be allowed to switch from day or evening programs with instructor and Department Head approvals. Students are encouraged to confer with the instructor of this major field of concentration during the first week of the semester to insure they are enrolled in the proper courses to meet their educational objectives
4. This program recommends a minimum qualification from the assessment testing for ENGL 801A and READ 881

#### ADDITIONAL DEPARTMENTAL REQUIREMENTS

1. Electrical Code Classes are not to be taken prior to completion of ELECT 204 or ELECT 200A.
2. A valid CPR card or concurrent registration in a CPR class is suggested while enrolled in Electricity courses

**For more departmental information call (562) 938-4505**

### STUDENTS MAY FOLLOW EITHER

**COURSES- DAY PROGRAM**

**REQUIRED- 40.0 UNITS plus ELECTIVES - 5.0 UNITS**



**COURSES-NIGHT PROGRAM**

**REQUIRED- 37.5 UNITS plus ELECTIVES - 7.5 UNITS**

**TOTAL DAY AND NIGHT PROGRAMS:**

**45 UNITS**

## DAY PROGRAM

|   |  |   |
|---|--|---|
|  | Students pursuing an Associate Degree for this field of concentration need to select from specific courses in general education disciplines. For a complete listing of courses or disciplines, refer to the Associate Degree information section of this guide OR view the guide online at <a href="http://osca.lbcc.edu">http://osca.lbcc.edu</a> . |  |
|---|--|---|

***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. Check each course for a list of prerequisites.

| <b>RECOMMENDED SEQUENCE OF CLASSES</b>  |            |   | <b>UNITS</b> | <b>In Progress</b> | <b>Completed Grade</b> |
|---|------------|---|--------------|--------------------|------------------------|
| #   | LEARN 11   | Learning & Academic Strategies <i>(see note below)</i>          | 2            |                    |                        |
|   | ELECT 253  | OSHA Standards for Construction Safety                          | 2            |                    |                        |
| %   | ELECT 41   | Technical Applications of Minicomputers <i>(see note below)</i> | 2            |                    |                        |
|   | ELECT 200A | First Semester Industrial Electricity (F)                       | 8            |                    |                        |
| †*  | ELECT 225  | Algebra & Trigonometry for Technicians                          | 4            |                    |                        |
| †   | ELECT 200B | Second Semester Industrial Electricity (SP)                     | 8            |                    |                        |
| †   | ELECT 200C | Third Semester Industrial Electricity (F)                       | 8            |                    |                        |
| †   | ELECT 435A | Electrical Motor Control 1 (F)                                  | 2            |                    |                        |
| †   | ELECT 200D | Fourth Semester Industrial Electricity (SP)                     | 8            |                    |                        |
| <b>Subtotal Units</b>   |            |   | <b>40</b>    |                    |                        |
| <b>AND</b>  |            |   |              |                    |                        |
| Complete the remaining 5.0 units from the Electrical Program Electives list below. <i>These electives can be taken at any time during the program as long as the prerequisites for the desired class have been met.</i> |            |   | 5            |                    |                        |
| <b>TOTAL UNITS</b>  |            |   | <b>45</b>    |                    |                        |

### Electrical Program ELECTIVES (Day & Night Programs)

|   |                  |   |     |  |  |
|---|------------------|---|-----|--|--|
|   | CISCO 250        | Network Cabling Installation  | 3   |  |  |
|   | CISCO 251        | Introduction to Networking  | 3   |  |  |
|   | ELECT 41         | Technical Applications of Minicomputers   | 2   |  |  |
| † | ELECT 224        | Electrical Motors and Transformers (SP)   | 3   |  |  |
| † | ELECT 226        | Solid State Fundamentals for Electricians (F)   | 3   |  |  |
| † | ELECT 227        | D.C. and A.C. Variable Speed Drives (SP)  | 3   |  |  |
| † | ELECT 229        | Industrial Drive Systems (F)  | 3   |  |  |
|   | ELECT 230A, B, C | Robotics Technology (3 units each)<br><i>(these three classes may be taken out of sequence)</i> | 3   |  |  |
|   | ELECT 261        | Introduction to Renewable Energy (F)  | 3   |  |  |
|   | ELECT 271        | Electrical Cost Estimating (INF)  | 3   |  |  |
|   | ELECT 275        | Electrical Pipe Bending (A) (F)   | 0.5 |  |  |
| † | ELECT 276        | Electrical Pipe Bending (B) (SP)  | 0.5 |  |  |
| † | ELECT 277        | Blueprint Reading for Electricians (F)  | 3   |  |  |
|   | ELECT 280        | Traffic Signals Systems 1 (INF)   | 3   |  |  |
|   | ELECT 283        | Traffic Systems Communications (INF)  | 3   |  |  |
| † | ELECT 284        | Traffic Signal Controllers & Digital Systems (INF)  | 3   |  |  |
| † | ELECT 435B       | Electrical Motor Control (B) (SP)   | 2   |  |  |

Any of these elective classes may be used in the fulfillment of a previous year's curriculum guide elective requirements.

**General frequency of course offering • SP = Spring, S = Summer, F = Fall, INF = Infrequently**



† This course has a prerequisite; prerequisite courses must be completed with at least a "C" or "P" grade (see catalog or schedule of classes).

\* This course is an exception to the "double-counting" rule; it may be double counted.

# This is a recommended course. It is not required and not part of the total units for the certificate or degree.

% This is an elective course and is recommended for any student who needs development of computer skills.

## NIGHT PROGRAM

|   |  |   |
|---|--|---|
|  | Students pursuing an Associate Degree for this field of concentration need to select from specific courses in general education disciplines. For a complete listing of courses or disciplines, refer to the Associate Degree information section of this guide OR view the guide online at <a href="http://osca.lbcc.edu">http://osca.lbcc.edu</a> . |  |
|---|--|---|

***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. Check each course for a list of prerequisites.

|                       |            | <b>RECOMMENDED SEQUENCE OF CLASSES</b>  | <b>UNITS</b> | <b>In Progress</b> | <b>Completed Grade</b> |
|-----------------------|------------|---|--------------|--------------------|------------------------|
| #                     | LEARN 11   | Learning & Academic Strategies <i>(see note below)</i>  | 2            |                    |                        |
|                       | ELECT 202  | Electrical Mathematics (see departmental admission requirements for alternatives to this class) | 3            |                    |                        |
|                       | ELECT 253  | OSHA Standards for Construction Safety  | 2            |                    |                        |
| %                     | ELECT 41   | Technical Applications of Minicomputers <i>(see note below)</i>                                 | 2            |                    |                        |
| +                     | ELECT 204  | Fundamentals of D.C. Electricity<br><i>+Must enroll in ELECT 204 and 210A concurrently</i>      | 3            |                    |                        |
| +                     | ELECT 210A | Laboratory Practices 1  | 1            |                    |                        |
| †*                    | ELECT 225  | Algebra & Trigonometry for Technicians  | 4            |                    |                        |
| †+                    | ELECT 209  | Fundamentals of Motors and Generators<br><i>+Must enroll in ELECT 209 and 210B concurrently</i> | 3            |                    |                        |
| †+                    | ELECT 210B | Laboratory Practices 2  | 1            |                    |                        |
| †                     | ELECT 240  | Electrical Code – Residential   | 3            |                    |                        |
| †+                    | ELECT 212  | Fundamentals of A.C. Electricity<br><i>+Must enroll in ELECT 212 and 210C concurrently.</i>     | 3            |                    |                        |
| †+                    | ELECT 210C | Laboratory Practices 3  | 1            |                    |                        |
| †                     | ELECT 435A | Electric Motor Control 1 (F)  | 2            |                    |                        |
| †+                    | ELECT 214  | A.C. Principles and Practices<br><i>+Must enroll in ELECT 214 AND 210D concurrently.</i>        | 3            |                    |                        |
| †+                    | ELECT 210D | Laboratory Practices 4  | 1            |                    |                        |
| †                     | ELECT 245  | Electrical Code - Commercial (F)  | 3            |                    |                        |
| †                     | ELECT 250  | Electrical Code - Industrial (SP)   | 3            |                    |                        |
| †                     | ELECT 242  | Electrical Code - Grounding (INF)   | 1.5          |                    |                        |
| <b>Subtotal Units</b> |            |   | <b>39.5</b>  |                    |                        |

### AND

Complete the remaining 7.5 units from the Electrical Program Electives list on the previous page for selection of the appropriate electives.

*These electives can be taken at any time during the program as long as the prerequisites for the desired class have been met.*

**TOTAL UNITS**

|           |  |  |
|-----------|--|--|
| 7.5       |  |  |
| <b>45</b> |  |  |

**General frequency of course offering • SP = Spring, S = Summer, F = Fall, INF = Infrequently**

† This course has a prerequisite; prerequisite courses must be completed with at least a "C" or "P" grade (see catalog or schedule of classes).

\* This course is an exception to the "double-counting" rule; it may be double counted.

# This is a recommended course. It is not required and not part of the total units for the certificate or degree.

% This is an elective course and is recommended for any student who needs development of computer skills.

## GRADUATION REQUIREMENTS

**For CERTIFICATE OF ACHIEVEMENT:**

This certificate is a one to two year program in occupational/technical areas at Long Beach City College which provide training in job skills and employment opportunities. Complete the required units listed above with a minimum grade of "C" in each course. Fifty percent (50%) or more of the unit requirements for this field of concentration must be completed in residence (credit earned by exam, where applicable, may be included).

**For ASSOCIATE DEGREE:**

The Associate Degree is a two-year college degree awarded by Long Beach City College that includes general education courses and a major. In addition to the requirements for the Certificate of Achievement, complete the A. A. degree requirements specified in the Catalog. The requirements for general education/proficiency and the field of concentration 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"). Fifty per cent (50%) or more of the unit requirements for this field of concentration must be completed in residence (credit earned by exam, where applicable, may be included).



**Requirement for Natural Sciences - Complete one of the following:**

Any one course (3 units minimum) appearing on the current CSU GE Breadth List ("Plan B") in areas B1, B2, or B3.

**NOTE:** To receive a certificate or degree you must submit completed application forms in the Admissions and Records Office during your final semester of course work.

In general, "double-counting" is not allowed. That is, one course may not be used to fulfill both a field of concentration requirement and to fulfill a general education requirement.

Math courses listed under the General Pattern for CSU Transfers 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 and shown in the college catalog.

**CERTIFICATES OF ACCOMPLISHMENT**

**For CERTIFICATE OF ACCOMPLISHMENT:**

This certificate builds competency in a specific area and requires less than 18 units. Complete the required units at Long Beach City College with an overall minimum 2.0 GPA. Submit a completed application for the Certificate of Accomplishment in the Admissions and Records Office during the final semester of course work.

FOR OFFICE USE ONLY: 4089

**Name of Certificate: Network Cabling Specialist**

| REQUIRED COURSES                            | UNITS    | In Progress | Completed Grade |
|---|----------|-------------|-----------------|
| CISCO 250      Network Cabling Installation | 3        |             |                 |
| <b>TOTAL UNITS</b>                          | <b>3</b> |             |                 |

FOR OFFICE USE ONLY: 4090

**Name of Certificate: Network Installation**

| REQUIRED COURSES                            | UNITS    | In Progress | Completed Grade |
|---|----------|-------------|-----------------|
| CISCO 250      Network Cabling Installation | 3        |             |                 |
| CISCO 251      Introduction to Networking   | 3        |             |                 |
| <b>TOTAL UNITS</b>                          | <b>6</b> |             |                 |

FOR OFFICE USE ONLY: 4091

**Name of Certificate: Network Installation and Design**

| <b>REQUIRED COURSES</b> |           |                              | <b>UNITS</b> | In Progress | Completed Grade |
|-------------------------|-----------|------------------------------|--------------|-------------|-----------------|
|                         | CISCO 250 | Network Cabling Installation | 3            |             |                 |
|                         | CISCO 251 | Introduction to Networking   | 3            |             |                 |
|                         | CISCO 252 | Routing and Access Control   | 3            |             |                 |
|                         | CISCO 253 | Cisco Networking III, LAN    | 3            |             |                 |
| <b>TOTAL UNITS</b>      |           |                              | <b>12</b>    |             |                 |

FOR OFFICE USE ONLY: 4029

**Name of Certificate: Traffic Signals Systems 1**

| <b>REQUIRED COURSES</b> |           |  | <b>UNITS</b> | In Progress | Completed Grade |
|-------------------------|-----------|--|--------------|-------------|-----------------|
|                         | ELECT 280 | Traffic Signals Systems 1                    | 3            |             |                 |
|                         | ELECT 283 | Traffic Systems Communications               | 3            |             |                 |
|                         | ELECT 284 | Traffic Signal Controllers & Digital Systems | 3            |             |                 |
| <b>TOTAL UNITS</b>      |           |  | <b>9</b>     |             |                 |

**Students interested in transferring to a university to continue their study in this field of concentration or other majors are strongly advised to consult an LBCC academic counselor and refer to the ASSIST website ([www.assist.org](http://www.assist.org)) for major preparation information. Counselors can clarify the different major and admissions requirements at a university. Students may visit the Student Success/Transfer Services Center to access further educational resources. If you need to set up an appointment to see a counselor or schedule the SOAR Test, call LAC (562)938-4561 or PCC (562)938-3920.**