

ELECTRICITY

MASTER PLAN OF INSTRUCTION 2020 - 2021

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MISSION

The mission of Fort Myers Technical College is to provide high quality career and technical training, in order to prepare students for current and emerging industries, delivered by a professional and caring staff in a positive learning environment.

The School District of Lee County does not discriminate on the basis of gender, race, color, age, religion, sex, sexual orientation, national or ethnic origin, marital status, or disability in the provision of educational programs, activities or employment policies as required by Title IX, Title VI, Title VII, Age Discrimination Act of 1967 and Section 504 of the Rehabilitation Act of 1973, 1992, Americans with Disabilities Act, the Florida Educational Equity Act of 1984 and the Boy Scouts of America Equal Access Act. Complaints, or requests for additional information regarding discrimination or harassment may be sent to: Equity Coordinator, Fort Myers Technical College, 3800 Michigan Ave., Fort Myers, FL 33916, (239) 334-4544.

Lack of English language skills will not be a barrier to admission and participation. The district may assess each student's ability to benefit from specific programs through placement tests and counseling, and, if necessary, will provide services or referrals to better prepare students for successful participation.



Fort Myers Technical College
3800 Michigan Avenue
Fort Myers, FL 33916
(239) 334-4544



Electricity

INTRODUCTION

In order to prepare students for rewarding employment in the electrical field, FMTC has devised a rigorous program divided into three levels of training. The program covers a broad range of instruction that will be outlined hereafter. Upon completion, students should be fully prepared for entry-level opportunities in electrical service, maintenance, and construction.

PROGRAM MISSION

The mission of the Electricity program is to provide rigorous training for students, so they can compete for entry level jobs in the electrical industry. Our goal is for each student to increase their working potential by providing experienced instruction in both theory and practical application.

PROGRAM PHILOSOPHY

We believe that competent workers in the high-performance workplace need:

1. Skills in communications, mathematics, critical thinking, teamwork, and effective work habits.
2. Training in emerging concepts and technologies.
3. Relevant work-based learning experience.

PROGRAM CONTENT

- Introduction to Electrical Wiring
- DC Circuits
- AC Circuits
- AC Theory and Solid State Devices
- Residential Wiring
- Commercial Wiring
- Installation of Transformers
- Motors
- Controls for Operation
- Blueprint & Plan Symbols – Calculations
- Tools, Materials, and Methods
- Single phase and 3 phase services
- Control Circuits
- Specialized Skills
- Employability Skills
- Entrepreneurship

ESSENTIAL TRAINING TASKS

Physical Requirements

- Plan layout and installation of electrical wiring, equipment, or fixtures, based on job specifications and local codes.
- Connect wires to circuit breakers, transformers, or other components.
- Test electrical systems or continuity of circuits in electrical wiring, equipment, or fixtures, using testing devices, such as ohmmeters, or voltmeters, to ensure compatibility and safety of system.
- Use a variety of tools or equipment, such as power construction equipment, measuring devices, power tools, and testing equipment, such as oscilloscopes, ammeters, or test lamps.
- Inspect electrical systems, equipment, or components to identify hazards, defects, or the need for adjustment or repair, and to ensure compliance with codes.

- Prepare sketches or follow blueprints to determine the location of wiring or equipment and to ensure conformance to building and safety codes.
- Diagnose malfunctioning systems, apparatus, or components using test equipment and hand tools to locate the cause of a breakdown and correct the problem.
- Work from ladders, or roofs to install, maintain, or repair electrical wiring, equipment, or fixtures.
- Advise management on whether continued operation of equipment could be hazardous.
- Maintain current electrician's license or identification card to meet governmental regulations

Skills

- **Troubleshooting** – Determining causes of operating errors and deciding what to do about it.
- **Repairing** – Repairing machines or systems using the needed tools.
- **Active Listening** – Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times.
- **Critical Thinking** – Using logic and reasoning to identify the strengths and weakness of alternative solutions, conclusions or approaches to problems.
- **Judgment and Decision-Making** – Considering the relative costs and benefits of potential actions to choose the most appropriate one.
- **Installation** – Installing equipment, machines, wiring, or programs to meet specifications.
- **Active Learning** – Understanding the implication of new information for both current and future problem-solving and decision making.
- **Complex Problem-Solving** – Identifying complex problems and reviewing related information to develop and evaluate options and implement solutions.
- **Equipment Maintenance** – Performing routine maintenance on equipment and determining when and what kind of maintenance is needed.
- **Instructing** – Teaching others how to do something.

Abilities

- **Problem Sensitivity** – The ability to tell when something is wrong or is likely to go wrong. It does not involve solving the problem, only recognizing there is a problem.
- **Deductive Reasoning** – The ability to apply general rules to specific problems to produce answers that make sense.
- **Inductive Reasoning** – The ability to combine pieces of information to form general rules or conclusions (includes finding a relationship among seemingly unrelated events).
- **Near Vision** – The ability to see details at close range (within a few feet of the observer).
- **Oral Comprehension** – The ability to listen to and understand information and ideas presented through spoken words and sentences.
- **Visual Color Discrimination** – The ability to match or detect differences between colors, including shades of color and brightness.
- **Arm-Hand Steadiness** – The ability to keep you hand and arm steady while moving your arm or while holding your arm and hand in one position.
- **Finger Dexterity** – The ability to make precisely coordinated movements of the fingers of one or both hands to grasp, manipulate, or assemble very small objects.
- **Information Ordering** – The ability to arrange things or actions in a certain order or pattern according to a specific rule or set of rules (e.g., patterns of numbers, letters, words, pictures, mathematical operations).
- **Manual Dexterity** – The ability to quickly move your hand together with your arm, or your two hands to grasp, manipulate, or assemble objects.

Work Activities

- **Getting Information** – Observing, receiving, and otherwise obtaining information from all relevant sources.
- **Identifying Objects, Actions, and Events** – Identifying information by categorizing, estimation, recognizing differences or similarities, and detecting changes in circumstances or events.
- **Making Decisions and Solving Problems** – Analyzing information and evaluating results to choose the best solution and solve problems.
- **Handling and Moving Objects** – Using hands and arms in handling, installing, positioning, and moving materials, and manipulating things.
- **Inspecting Equipment, Structures, or Material** – Inspecting equipment, structures, or materials to identify the cause of errors or other problems or defects.
- **Monitor Processes, Materials, or Surroundings** – Monitoring and reviewing information from materials, events, or the environment, to detect or assess problems.
- **Updating and Using Relevant Knowledge** – Keeping up-to-date technically and applying new knowledge to your job.
- **Organizing, Planning, and Prioritizing Work** – Developing specific goals and plans to prioritize, organize, and accomplish your work.
- **Evaluating Information to Determine Compliance with Standards** – Using relevant information and individual judgment to determine whether events or processes comply with laws, regulations, or standards.
- **Performing General Physical Activities** – Performing physical activities that require considerable use of your arms and legs and moving your whole body, such as climbing, lifting, balancing, walking, stooping, and handling of materials.

Cognitive Requirements

Must have the ability to:

- Handle confrontation and frustration and assist in problem resolution.
- Interpret a variety of instructions furnished in written, oral, and diagrammatic form
- Collaborate with others
- Cope with high levels of stress
- Perform mathematical computations at a level of ninth grade or higher
- Make fast decisions under pressure
- Demonstrate a high degree of patience
- Read and understand computer and related equipment
- Work in close or crowded areas

ACCOMMODATIONS

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or post-secondary student's accommodations plan to meet individual needs to ensure equal access. Post-secondary students with disabilities must self-identify, present documentation, required accommodations if needed, and develop a plan with their post-secondary service provider. Accommodations received in post-secondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology, and special communication systems. Documentation of the accommodations requested and services provided are maintained in a confidential file.

TUITION

Tuition is charged for adult students at a reasonable rate that may vary slightly from year to year and is due prior to the first day of each semester. Current fee information is available from Student Services. Tuition

is waived for eligible high school dual-enrolled students. Failure to pay all fees due at the time class begins will result in the student not being able to attend class and/or clinical.

CLASS SCHEDULE

Daytime certificated classes meet Monday through Friday from 8:00 A.M. until 2:30 P.M. This amounts to 30 hours of classroom instruction per week. Lunch breaks are 30 minutes in length.

ATTENDANCE POLICY

In an effort to develop appropriate employability skills, FMTC students are expected to attend all class sessions. As is expected in the workplace, when it is necessary to be absent due to illness or emergency situations, all students are to notify the instructor on or before the date of absences. The student attendance policy for each post-secondary program is consistent with industry standards.

Campus attendance is kept via a computerized system. It is the responsibility of the student to log in and out in order to receive credit for class time. This allows the school to keep accurate attendance records for the actual number of hours and minutes attended.

All adult students are expected to be in attendance at least 90% of their scheduled hours during each semester. Adult students failing to maintain the 90% attendance standard will not be permitted to continue in their program and may be required to sit out one full semester, unless administration approves to waive the 90% standard based on special circumstances.

Absences

A student who is absent for 6 consecutive class sessions, without prior approval and without contact with the instructor, will be withdrawn from enrollment in his/her program. A student withdrawn for absenteeism must petition administration to return. Students exhibiting a pattern of consecutive absences of 4 days will be subject to dismissal as determined by a School Intervention Team. School Intervention Team meetings will be held as necessary to attempt to alleviate issues resulting in excessive absences and to counsel the student of possible alternatives and consequences.

Students, who are late for class, including returning late from lunch, must clock in. Students who leave school early must notify their instructor and clock out. This time out of class is recorded as time absent and is counted against the required 90% attendance. Excessive tardies or early departures will be reported to the Student Affairs Specialist and will result in a meeting with the School Attendance Intervention Team.

Adult students who know they will be out of school for an extended period of time (4 days or longer) may apply for a Leave of Absence from their program. A Leave of Absence will be granted only once during a twelve month period. **STUDENTS WHO EXERCISE A LEAVE OF ABSENCE MAY HAVE TO EXTEND THEIR TIME IN THEIR PROGRAM AND PAY ADDITIONAL FEES.**

Leaving Campus During School Hours

Students must notify their instructor when leaving campus early. This is for the safety of students, to accurately track time, and to allow the instructor to best utilize instructional resources.

PLAN OF INSTRUCTIONAL PRACTICES

Teaching Methods

The curriculum will be taught by a combination of methods and will evolve as the student progresses through the three courses. Students will be expected to complete multiple reading assignments per day. Hands on training will follow when applicable. There will be written as well as Lab projects due each week. Students will gain knowledge in commercial construction by repair and maintenance of the schools electrical system.

Safety

Students will find that safety is a critical component of the Electrical industry. It will be the first order of business for every new student. Personal protective equipment (PPE) such as safety glasses and hard hats are required on many industry locations. Students must have required PPE equipment available on a daily basis.

Evaluation

Tests will be administered on a weekly basis both written and online. At least 10 hours of written and computer-based assignments will be completed each week. Lab projects will be evaluated based on criterion reference models and/or checklists. Interpersonal skills are as important to success as is the knowledge to use a power tool --- good behavior, teamwork, safety, cleanliness, punctuality, and a positive attitude will be required if you are to fully succeed.

Work-Based Activities

Work-based learning activities play an integral part of the curriculum of FMTC's career-technical training programs. These activities are planned with two objectives in mind. First, the activity provides students with opportunity to develop and apply 'real world' experience using the knowledge and skills attained in the program. Second, the activity provides the instructor with objective input from potential employers or customers of program graduates. Each work-based activity has a written instructional plan outlining objectives, experiences, competencies, and evaluation required during the activity.

Work based activities are program specific and may include:

- Unpaid in-school shop activities to provide customer service opportunities under the direct supervision of the program instructor.
- Unpaid job shadowing experiences that may include in-school or off-campus employer-based experiences under the supervision of a qualified employer representative who is working closely with the program instructor.
- Paid or unpaid cooperative training experiences conducted at the employer's work location under the supervision of a qualified employer representative and under the direction of the program instructor.

Cooperative Education

Cooperative training is available for students and coordinated by the instructor and career specialist. Cooperative training is for students who have shown competence in program training that indicates readiness for placement in an on-the-job program. High school students participating in the cooperative job placement program must be in the 12th grade. To be eligible for a cooperative education experience, students must have completed one-half of the required program hours and requirements.

Students may be returned to the program for additional training if they do not function satisfactorily on the job or when the cooperative agreement is terminated at the request of the student, parent, employer, or program instructor. Veterans will be accepted in the program in accordance with the Department of Veterans Affairs approved program.

Additional information regarding cooperative opportunities may be obtained from the program instructor or career specialist.

Job Shadowing

Job shadowing experiences, or volunteer experiences, are available to students as part of their program training. These experiences are designed to give the student actual hands-on experiences doing a variety of related tasks. Length and type of experiences will vary. The program instructor determines appropriateness of the experience. Additional information regarding job-shadowing experiences may be obtained from the program instructor or career specialist.

GRADING PROCEDURES

Teacher Grading Procedure:

Daily Work - Daily Grade Sheet	25%
Weekly Homework	25%
Lab Work - Practice Labs & Projects	25%
Tests	25%

County Grading Policy:

All student work will be taken into consideration when determining student grades. Oral and written test, group discussions, written work, checklists, homework, and student projects are all representative means which may be used to determine student grades.

The grading scale for the county is:

A	90-100
B	80-89
C	70-79
D	60-69
F	0-59

Fort Myers Technical College is a post-secondary institute designed to provide trained individuals to industry. The approved post-secondary program grading requirements must be met if the student is to receive a certificate.

Program Progress

Students are required to complete the program of training within the hours allotted by the state of Florida for completion. Progress must be at a rate that will allow completion of the program with the number of membership hours stated in the Curriculum Frameworks.

Failure to progress at this rate will require the student to meet with the program instructor, career specialist, and an administrator in order to identify an appropriate completion point or to assist the student in selecting a more appropriate training program.

Work Habits

Effective work habits are the cornerstone to successful employment. Students are expected to demonstrate productive work habits during all phases of enrollment. Instructors will work with students who need assistance in this area to improve the overall possibility for successful employment.

Attendance: Attends class, arrives/leaves on time; begins and ends work as expected.

Character: Displays loyalty, honesty, trustworthiness, dependability, reliability, initiative, self-discipline, and self-responsibility; displays a high level of effort and commitment to performing and completing work.

Teamwork: Respects the right of others; respects confidentiality; is cooperative; is assertive; displays a customer service attitude; seeks opportunities for continuous learning; demonstrates mannerly behavior; encourages and facilitates cooperation, pride, trust, and group identity; fosters commitment and team spirit.

Appearance: Displays appropriate dress, grooming, hygiene, and etiquette; wears full regulation uniform.

Attitude: Displays a willingness to cooperate and accept constructive criticism; sets realistic expectations; approaches assignments with interest.

Productivity: Is prepared for class by reading assignments and completing homework; contributes to class discussions; and involvement in lab activities (in other words, no sleeping or daydreaming). Follows safety practices; conserves and maintains equipment and supplies; keeps work area neat and clean; follows directions and procedures; makes up assignments and tests punctually; notifies proper authorities of situations presenting potential safety hazards; does not use or knowingly permits others to use tools and equipment improperly; stays on task and utilizes time constructively.

Organization: Manifests skill in prioritizing and management of time and stress; demonstrates flexibility in adapting to changes.

Communication: Communicates accurate information to others in a professional and courteous manner; displays appropriate nonverbal (eye contact, body language) and oral (listening, telephone etiquette, grammar) skills; asks pertinent questions; listens attentively to others, notifies instructor in advance of absences or tardies.

SATISFACTORY ACADEMIC PROGRESS

In order to receive and continue to receive financial assistance of any type, a student must maintain satisfactory academic progress. The Financial Aid Advisor will require a progress report to be completed by the student's instructor and submitted to the Financial Aid Office prior to each disbursement.

Students are considered to be making Satisfactory Academic Progress (SAP) if they successfully complete their scheduled clock hours, achieve a specific cumulative grade evaluation or grade point average (GPA), and do not exceed the maximum time limits to complete their course of study. Each Student Academic Progress will be checked at 450 clock hours and prior to subsequent disbursements for students enrolled in programs one academic year or greater. Progress will be checked at the half-way point for programs less than one academic year. No SAP is required prior to the first disbursement.

REQUIREMENTS FOR A CERTIFICATE

All competencies specified in the state of Florida Curriculum Frameworks for the program must be successfully completed. Successful completion is at least a 75% average in the areas of skills, knowledge, and work habits.

Proficiency in the competency standards listed in the Master Plan of Instruction must be demonstrated.

Students must meet minimum T.A.B.E. skill requirements (or qualify for an exemption) prior to graduation.

In addition to the requirements above, the recommendation of the instructor for certification includes: consideration of personal appearance, employability skills, a willingness to learn and to work, punctuality, cooperative attitude, and appropriate work habits.

ELECTRICITY STUDENT DRESS CODE

Students who attend FMTC shall dress in a manner appropriate for the job in which they are receiving training, including any special protective gear and professional uniforms. All clothing must be neither distracting nor offensive and be clean, neat, modest, in good repair, and appropriately sized.

Administration has the final authority for determining whether or not a student's apparel conforms to the dress code. When it is determined that it does not, students will be required to change into appropriate clothing.

Dress Code/Uniforms Required: FMTC Electricity Uniform Khaki Shirts (included in tuition and fees) tucked into pants at the waist, work pants, and work shoes with non-conductive soles; no canvas sneakers allowed.

JOB DESCRIPTIONS

OCP A Electrician Helper (300 Hours)

Helpers are expected to do rudimentary tasks as laid out by their lead person or job foreman. This may include material handling, ditch digging and preparatory work in new construction, attic work, dock wiring, and equipment installation in service work.

OCP B Residential Electrician (450 Hours)

Residential electricians read blueprints and layout single family homes. They install the boxes and cables during the rough in phase of new construction. They return to trim the devices and install lights and fans. Residential Service Electricians add receptacles, light and switches on existing homes.

OCP C Commercial Electrician (450 Hours)

Commercial electricians work on large projects with heavier equipment and higher voltages. They must be familiar installing complex raceway and wiring systems. They may need to work at great heights from scaffolds or hydraulic lifts.

TEXTBOOKS

For the most recent book list for the Electricity program, visit FMTC's online bookstore – www.fmtcshop.com.

REQUIRED MATERIALS

- (2) Loose-leaf notebooks
- (1) 3 ring binder 1”
Notebook paper (non-spiral)
- (2) #2 Pencils w/erasers
- Yellow highlighter
- Colored pencils or markers (Red, Black, Yellow, Green) 1 of each color
- Calculator with the following functions: (+,-,√, x2, %, 1/x)

Tools (included in tuition and fees):

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|--|---|
| 1 – Safety goggles –required | 1 – 18 Volt Cordless Hammer Drill |
| 1 – Electrical tool pouch and belt | 1 – Drill/Driver Set |
| 1 – Magnetic torpedo level | 1 – Multi-tap #6, #8, #10-32 #625-24 |
| 1 – Klein flat blade screwdriver or equivalent #605-6 | 1 – Multi-wrench Allen set (med. size) |
| 1 – Klein flat blade screwdriver or equivalent #602-4 | 1 – Multi-wrench Allen set (large size) |
| 1 – Klein #2 Philips head-screwdriver or equivalent #603-4 | 1 – 61-086 Vol-Con tester |
| 1 – Klein needle nose pliers or equivalent #22152C | |
| 1 – Klein diagonal cutter #D252-6 or equivalent #220-7 or #252-6 | |
| 1 – Klein pair of side cutters #D213-9NC or equivalent #2139ETP | |
| 1 – Klein 25ft. measuring tape or equivalent | |
| 1 – Scratch awl #650 Klein | |
| 1 – Klein 16 oz. straight claw hammer or equivalent | |
| 2 – Channel locks | |
| 1 – Stripper #1010 Klein or equivalent | |
| 1 – Retractable Razor Knife | |

PROGRAM OBJECTIVES

See the attached Florida Department of Education Curriculum Frameworks for program objectives and competencies.

**Florida Department of Education
Curriculum Framework**

Program Title: Electricity
Program Type: Career Preparatory
Career Cluster: Architecture and Construction

PSAV	
Program Number	I460312
CIP Number	0646030202
Grade Level	30,31
Standard Length	1200 Hours
Teacher Certification	ELECTRICAL @7 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	47-3013 - Helpers--Electricians 47-2111 - Electricians
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml
Basic Skills Level	Mathematics: 9 Language: 9 Reading: 9

Purpose

The purpose of this program is to prepare students for employment or advanced training in a variety of construction electrical industries.

This program focuses on broad, transferable skills, stresses the understanding of all aspects of the electricity industry, and demonstrates such elements of the industry as planning, management, finance, technical and production skills, underlying principles of technology, labor issues, community issues, and health, safety, and environmental issues.

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Architecture and Construction career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Architecture and Construction career cluster. **Additional Information** relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of three occupational completion points.

This program is comprised of courses which have been assigned course numbers in the SCNS (Statewide Course Numbering System) in accordance with Section 1007.24 (1), F.S. Career and Technical credit shall be awarded to the student on a transcript in accordance with Section 1001.44(3)(b), F.S.

The following table illustrates the post-secondary program structure:

OCP	Course Number	Course Title	Length	SOC Code
A	BCV0603	Electrician Helper	300 Hours	47-3013
B	BCV0640	Residential Electrician	450 Hours	47-2111
C	BCV0652	Commercial Electrician	450 Hours	47-2111

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.
2. Apply appropriate academic and technical skills.
3. Attend to personal health and financial well-being.
4. Communicate clearly, effectively and with reason.
5. Consider the environmental, social and economic impacts of decisions
6. Demonstrate creativity and innovation.
7. Employ valid and reliable research strategies.
8. Utilize critical thinking to make sense of problems and persevere in solving them.
9. Model integrity, ethical leadership and effective management.
10. Plan education and career path aligned to personal goals.
11. Use technology to enhance productivity.
12. Work productively in teams while using cultural/global competence.

Standards

After successfully completing this program, the student will be able to perform the following:

- 01.0 Explain the importance of health, safety, environmental stewardship and related regulatory compliance.
- 02.0 Identify, use and maintain the tools and accessories used in the electrical industry.
- 03.0 Demonstrate an understanding of basic Direct-Current (DC) electrical-circuit skills.
- 04.0 Apply mathematics knowledge and skills to electricity.
- 05.0 Demonstrate an understanding of basic electricity.
- 06.0 Read and interpret basic electric codes.
- 07.0 Apply mathematics knowledge and skills to electricity.
- 08.0 Demonstrate further understanding of electricity.
- 09.0 Demonstrate science knowledge and skills related to electrical principles.
- 10.0 Demonstrate proficiency in electrical math problems and skills.
- 11.0 Demonstrate Alternating-Current (AC) circuit skills.
- 12.0 Explain the importance of employability and entrepreneurship skills.
- 13.0 Install residential wiring.
- 14.0 Install residential wiring systems.
- 15.0 Demonstrate proficiency in commercial wiring.
- 16.0 Demonstrate specialized electrical skills.