

# INDUSTRIAL ELECTRONICS TECH (IETTI)

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## Courses

### IETTI-101 DC CIRCUIT THEORY 4.00 Credits

This course teaches the theory of DC and basic digital logic circuits with an emphasis on physical conservation laws as unifying principles, including series-parallel network analysis, network theorems, electromagnetism, discrete semiconductor devices and switching circuits, basic digital electronics through combinational logic, and basic programmable logic controllers (PLCs). Students will also learn how to write SPICE netlists to simulate simple circuits. Mastery-style written exams guarantee attainment of conceptual learning outcomes, while oral presentations and Socratic dialogue demonstrate communicative learning outcomes. Pre-requisite/Co-requisite: MTHPT-137 or higher.

### IETTI-102 DC CIRCUIT PROJECTS 4.00 Credits

This course reinforces the content of IETTI-101 (DC Circuit Theory) through multiple student-designed projects, each project's scope and functional criteria defined by the instructor with input from the student. This course also prepares the student for entry into the profession through resume and cover letter writing as well as job research. All students must present their job research findings at the Technical Advisory Committee (TAC) meeting held with industry advisors. Pre-requisite/Co-requisite: MTHPT-137 or higher.

### IETTI-103 DC CIRCUIT EXPERIMENTS 4.00 Credits

This course reinforces the content of IETTI-101 (DC Circuit Theory) through student-designed experiments. All experiments employ scientific method: proposing falsifiable hypotheses, devising procedures, gathering data, analyzing results, and developing documentation. Students also apply foundational circuit principles to the diagnosis of simulated and real faults in these same types of circuits. Mastery standards applied to all experimental and diagnostic activities guarantee attainment of learning outcomes. Pre-requisite/Co-requisite: MTHPT-137 or higher.

### IETTI-104 AC CIRCUIT THEORY 4.00 Credits

This course teaches the theory of AC and state-based digital logic circuits with an emphasis on physical conservation laws and other foundational concepts as unifying principles, including AC measurements, series-parallel reactive networks, transformers, harmonics, polyphase AC power systems, power conversion circuits, latch-based digital logic circuits, and programmable logic controller (PLC) counting and timing functions. Mastery-style written exams guarantee attainment of conceptual learning outcomes, while oral presentations and Socratic dialogue demonstrate communicative learning outcomes. Pre-requisite: MTHPT-137 or higher.

### IETTI-105 AC CIRCUIT PROJECTS 4.00 Credits

This course reinforces the content of IETTI-104 (AC Circuit Theory) through multiple student-designed projects, each project's scope and functional criteria defined by the instructor with input from the student. This course also prepares the student for entry into the profession through resume and cover letter writing as well as job research. All students must present their job research findings at the Technical Advisory Committee (TAC) meeting held with industry advisors. Additionally, students take a comprehensive exam covering all theory course topics to date. Pre-requisite: MTHPT-137 or higher.

### IETTI-108 INTRODUCTION TO PLC'S 4.00 Credits

Today's electronic technicians must be familiar with programmable logic controllers (PLC's) as they are widely used in the industry. The course begins with an introduction to programmable logic controller hardware, memory, I/O modules, numbering systems, and programming devices. The learner will then gain experience working with PLC wiring diagrams, PCL setup configuration, and ladder logic programming. Pre-requisite: IETTI-101 or IMMTI-115, and MTHPT-103 or instructor permission. Cross-listed with IMMTI-108.

### IETTI-110 BASIC DC CIRCUIT LAB 2.00 Credits

Students will construct, analyze, predict and measure DC circuits while selecting and using appropriate test equipment. Project reports require design concepts, theoretical application, and demonstration of principles and practices learned in math, field practice and laboratory. Students will learn to adhere to safe work practices and demonstrate the proper techniques of soldering and de-soldering circuit components. Students will be required to demonstrate competency with working in groups and demonstrating appropriate interpersonal relationships. Pre-requisite: IETTI-101.

### IETTI-112 AC CIRCUIT EXPERIMENTS 4.00 Credits

This course reinforces the content of IETTI-104 (AC Circuit Theory) through student-designed experiments. All experiments employ scientific method: proposing falsifiable hypotheses, devising procedures, gathering data, analyzing results, and developing documentation. Students also apply foundational circuit principles to the diagnosis of simulated and real faults in these same types of circuits. Mastery standards applied to all experimental and diagnostic activities guarantee attainment of learning outcomes. Pre-requisite: MTHPT-137 or higher.

### IETTI-190 DIRECTED STUDY IN INDUSTRIAL ELECTRONICS TECHNOLOGY 1.00-12.00 Credits

Required study in area agreed upon by the student and the instructor. Might include specialized devices, new products, or advanced troubleshooting.

### IETTI-201 INTRO TO INSTRUMENTATION 4.00 Credits

Industrial electronics technicians work with equipment that sense and control pressure, temperature, flow and level. These technicians must also calibrate and service these systems. This course also covers OP-AMPS, analog-digital conversion circuits, and PID controllers.

### IETTI-204 PROGRAMMING HUMAN MACHINE INTERFACES (HMI) 4.00 Credits

This course will introduce the student to software and hardware that allows machine operators to interface with PLC control systems.

### IETTI-205 ELECTRIC MOTORS, DRIVES AND CONTROLS 4.00 Credits

This course will introduce the student to DC and AC motors, electrical diagrams, motor starters, motor control circuits, three phase power, ac and dc motor drives, and motor maintenance. Cross-listed with IMMTI-205.

**IETTI-207 PROGRAM AND TROUBLESHOOT PLC'S 4.00 Credits**

Today's electronic technician must be familiar with programmable logic controllers (PLC's) as they are widely used in industry. This course continues the ladder logic programming started in IETTI 108. The learner will also be exposed to the types of PLC communications and troubleshooting with a PLC.

**IETTI-208 PLC'S SYSTEMS APPLICATIONS 4.00 Credits**

Today's electronic technician must be familiar with programmable logic controllers (PLC's) as they are widely used in industry. This course will give the learner additional training in programming and networking PLCs. It will also introduce him/her to motion control and operator interface devices and provide him/her with more hands-on experience. Pre-Requisite: IETTI-101, IETTI-104, and IETTI-108.

**IETTI-211 ADVANCED INSTRUMENTATION 4.00 Credits**

This course will continue to present the theories, applications and procedures for process control and instrumentation introduced in IETTI-201. Instrument technicians calibrate and service equipment that sense and control pressure, temperature, flow, and level for process control systems. Pre-requisite: IETTI-101 with a grade of C or better and permission from the instructor.

**IETTI-220 INTERMEDIATE ELECTRONICS PROJECTS 4.00 Credits**

This course reinforces the content of IETTI-222 (Intermediate Electronics Theory) through multiple student-designed projects, each project's scope and functional criteria defined by the instructor with input from the student. In cases where the project is built for an external client, feedback from the client helps determine the project grade. This course also prepares the student for entry into the profession through resume and cover letter writing as well as job research. All students must present their job research findings at the Technical Advisory Committee (TAC) meeting held with industry advisors. Additionally, students take a comprehensive exam covering all theory course topics to date. Pre-requisite: MTHPT-137 or higher.

**IETTI-221 INTERMEDIATE ELECTRONICS EXPERIMENTS 4.00 Credits**

This course reinforces the content of IETTI-222 (Intermediate Electronics Theory) by way of experimental system design and construction, starting with only a block diagram and a general description of the system's intended function. Students then engineer all details of the system, building and testing it in stages. Students also apply foundational circuit principles to the diagnosis of simulated and real faults in these same types of circuits. Mastery standards applied to all experimental and diagnostic activities guarantee attainment of learning outcomes. Pre-requisite: MTHPT-137 or higher.

**IETTI-222 INTERMEDIATE ELECTRONICS THEORY 4.00 Credits**

This course reviews DC and AC circuit theory while introducing principles of C-language computer programming, then builds on that foundation to explore analog amplifier circuits (both discrete-transistor and operational amplifier), principles of RF and radio systems, operational amplifier circuits, AC motor controls, and protective relaying. Mastery-style written exams guarantee attainment of conceptual learning outcomes, while oral presentations and Socratic dialogue demonstrate communicative learning outcomes. Pre-requisite: MTHPT-137 or higher.

**IETTI-223 ADVANCED ELECTRONICS THEORY 4.00 Credits**

This course introduces microprocessor systems -- including computer programming in both assembly language and C -- and also explores serial data communication, advanced RF topics (e.g. modulation, mixers, Smith charts, VNAs), industrial signal conditioning, and industrial control systems. Mastery-style written exams guarantee attainment of conceptual learning outcomes, while oral presentations and Socratic dialogue demonstrate communicative learning outcomes. Pre-requisite: MTHPT-137 or higher.

**IETTI-224 ADVANCED ELECTRONICS III 4.00 Credits**

This course is an introduction to the transient response analysis of RLC circuits. First, the computation of the transient response through classical differential equation techniques is covered. Next, Laplace transform techniques are studied, unifying both the transient and frequency response techniques. Then, Fourier analysis techniques are introduced to familiarize the students with the fundamentals of signal analysis. Finally, the State Variable technique is used to compute the transient response of RLC networks. Throughout the course, the lectures are supported by experimental work that make use of the hardware and computer-aided facilities available in the program. Prerequisite: MATH-170 and instructor approval.

**IETTI-225 ADVANCED ELECTRONICS EXPERIMENTS 4.00 Credits**

This course reinforces the content of IETTI-223 (Advanced Electronics Theory) by way of experimental system design and construction, starting with only a block diagram and a general description of the system's intended function. Students then engineer all details of the system, building and testing it in stages. Students also apply foundational circuit principles to the diagnosis of simulated and real faults in these same types of circuits. Mastery standards applied to all experimental and diagnostic activities guarantee attainment of learning outcomes. Pre-requisite: MTHPT-137 or higher.

**IETTI-226 ELECTRONICS CIRCUIT TROUBLESHOOTING 3.00 Credits**

Electronics Engineering Technicians work with analog and digital electronic systems. In this course, students will learn what to do when these systems don't work. Students will be introduced to basic troubleshooting techniques including test equipment, component identification, fault isolation, and documentation. The learner will be required to demonstrate mastery of all the course objectives.

**IETTI-236 ADVANCED ELECTRONICS PROJECTS 4.00 Credits**

This course reinforces the content of IETTI-223 (Advanced Electronics Theory) through multiple student-designed projects, each project's scope and functional criteria defined by the instructor with input from the student. In cases where the project is built for an external client, feedback from the client helps determine the project grade. This course also prepares the student for entry into the profession through resume and cover letter writing as well as job research. All students must present their job research findings at the Technical Advisory Committee (TAC) meeting held with industry advisors. Additionally, students take a comprehensive exam covering all theory course topics to date. Pre-requisite: MTHPT-137 or higher.

**IETTI-290 DIRECTED STUDY IN INDUSTRIAL ELECTRONICS TECHNOLOGY 1.00-10.00 Credits**

Required study in area agreed upon by the student and the instructor. Might include specialized devices, new products, or advanced troubleshooting.

**IETTI-292 DIRECTED SPECIAL PROJECTS 3.00 Credits****IETTI-294 INTERNSHIP IN INDUSTRIAL ELECTRONICS 1.00-12.00 Credits**

Work experience in business related to student's career goals. Student is a paid part-time employee working under the supervision of the employer and program coordinator.

**IETTI-390 DIRECTED STUDY IN INDUSTRIAL ELECTRONICS TECHNOLOGY 12.00 Credits**

Required study in area agreed upon by the student and the instructor. Might include specialized devices, new products, or advanced troubleshooting.

**IETTI-394 INTERNSHIP IN INDUSTRIAL ELECTRONICS 12.00 Credits**

Work experience in business related to student's career goals. Student is a paid part-time employee working under the supervision of the employer and program coordinator.