



ADDENDUM

This addendum revises MIAT College of Technology
Catalog, Volume 60 dated March 4, 2015
Effective: April 2, 2015

32 Programs of Study

Energy Technology-AAS

The Energy Technology Program is a combination of classroom, hands-on assignments and outside work/homework. Power generation, power plant operations, wind power, compression technology and process systems are covered. Upon successful completion of the Energy Technology program, graduates will have entry-level career choices in a variety of areas in the energy industry to include, **Wind, Gas, Coal, Nuclear, Solar, Standby Power, Geothermal, Hydroelectric, Methane/Landfill Gas Generation, Power Distribution and Dispatch, and Water Treatment.** A sample of job titles include: Power Plant Operator, Maintenance Worker/Repairer, Industrial Mechanic, Electrical/Electrician Repairer, Auxiliary Operator, Control Operator, Operations and Maintenance Technician, Field Service Technician, Boiler Operator, Gas Turbine Technician, Wind Turbine Construction Technician, Wind Service Technician, and Solar Installation Technician. Additionally, the general education courses expand and enhance non-technical skills important to the career growth and development of graduates of this program.

Energy Technology Program
Associate in Applied Science (AAS)
1440 Clock Hours
94 Quarter Credit Hours
All Quarters are a minimum of ten calendar weeks
Day or Afternoon Program
16 Months/7 Quarters

Course Number	Course Name	Clock Hours	Credit Hours
ET101-1	Learning Skills, History and Math	72	4.5
ET102-1	OSHA	48	3.0
ET103-1	Tools and Professional Skills	48	3.0
ET104-1	Precision Measuring and Rigging	72	4.0
ET107-1	DC Electrical Theory	60	3.5
ET108-1	AC Electrical Theory	60	3.5
ET213-1	Three-Phase Theory	84	5.0
ET106-1	Inspection	36	2.0
ET109-1	Climb and Rescue	54	3.0
ET110-1	Wind Operation	66	4.0
ET111-1	Wind Turbine Components	60	3.5
ET112-1	Renewable Energy Sources	60	3.5
ET113-1	Gas Turbine and Co-Generation Operation	66	4.0
ET114-1	Gas Turbine Maintenance	54	3.0
ET115-1	Boiler Operation	60	3.5
ET116-1	Steam Operation	60	3.5
ET209-1	Process Systems and Components	60	3.5
ET210-1	Refining Processes and Energy Platform Service	60	3.5
ET211-1	Compression Technology	30	1.5
ET214-1	Materials, Processes, Welding and Advanced Troubleshooting	90	5.0

GENERAL EDUCATION SECTION

Course Number	Course Name	Clock Hours	Credit Hours
GE110-3	Intermediate Algebra	40	4.0
GE111-3	English Composition	40	4.0
GE112-3	Public Speaking	40	4.0
GE113-3	Introduction to Sociology	40	4.0
GE114-3	Environmental Sciences	40	4.0
GE115-3	Principles of Management	40	4.0

36 Programs of Study

Energy and Industrial Technician Program

The Energy and Industrial Technician Program is a combination of classroom, hands-on assignments and outside work/homework. Power generation, power plant operations, compression technology and process systems are covered. Upon successful completion of the Energy and Industrial Technician program, graduates will have entry-level career choices in a variety of the following areas: **Gas, Coal, Nuclear, Solar, Standby Power, Geothermal, Hydroelectric, Methane/Landfill Gas Generation, Power Distribution and Dispatch, Water Treatment, Equipment Repair and Installation, Testing, Inspecting, Assembly and Production.** A sample of job titles include: Power Plant Operator, Maintenance Worker/Repairer, Industrial Mechanic, Electrical/Electrician Repairer, Auxiliary Operator, Control Operator, Operations and Maintenance Technician, Field Service Technician, Boiler Operator, Gas Turbine Technician, Solar Installation Technician, Manufacturing Technician, Fabricator, Production Technician and Assembly Technician.

Energy and Industrial Technician Program
Certificate
960 Clock Hours
56 Quarter Credit Hours
All Quarters are a minimum of ten calendar weeks
Day or Afternoon Program:
9 Months/4 Quarters

Course Number	Course Name	Clock Hours	Credit Hours
ET101-1	Learning Skills, History and Math	72	4.5
ET102-1	OSHA	48	3.0
ET103-1	Tools and Professional Skills	48	3.0
ET104-1	Precision Measuring and Rigging	72	4.0
ET107-1	DC Electrical Theory	60	3.5
ET108-1	AC Electrical Theory	60	3.5
ET213-1	Three-Phase Theory	84	5.0
ET106-1	Inspection	36	2.0
ET113-1	Gas Turbine and Co-Generation Operation	66	4.0
ET114-1	Gas Turbine Maintenance	54	3.0
ET115-1	Boiler Operation	60	3.5
ET116-1	Steam Operation	60	3.5
ET209-1	Process Systems and Components	60	3.5
ET210-1	Refining Processes and Energy Platform Service	60	3.5
ET211-1	Compression Technology	30	1.5
ET214-1	Materials, Processes, Welding and Advanced Troubleshooting	90	5.0

39 Programs of Study

Wind Power Technician Program

The Wind Power Technician Program is a combination of classroom, hands-on assignments and outside work/homework. Upon successful completion of the Wind Power Technician program, graduates will have entry-level career choices in areas in the wind energy industry to include **Service, Manufacturing, Construction, Commissioning, and Sales**. A sample of job titles include: Wind Service Technician, Wind Turbine Construction Technician, Composites Technician, Control Room Operator, Generator/Winder, and Wind Turbine Sales Representative.

Wind Power Technician Program

Certificate

720 Clock Hours

42.5 Quarter Credit Hours

All Quarters are a minimum of ten calendar weeks

Day or Afternoon Program

7 Months/3 Quarters

Course Number	Course Name	Clock Hours	Credit Hours
ET101-1	Learning Skills, History and Math	72	4.5
ET102-1	OSHA	48	3.0
ET103-1	Tools and Professional Skills	48	3.0
ET104-1	Precision Measuring and Rigging	72	4.0
ET107-1	DC Electrical Theory	60	3.5
ET108-1	AC Electrical Theory	60	3.5
ET213-1	Three-Phase Theory	84	5.0
ET106-1	Inspection	36	2.0
ET109-1	Climb and Rescue	54	3.0
ET110-1	Wind Operation	66	4.0
ET111-1	Wind Turbine Components	60	3.5
ET112-1	Renewable Energy Sources	60	3.5

Course Descriptions

Energy Technology-AAS Energy and Industrial Technician Wind Power Technician

Course	Description	Clock Hours	Credit Hours
ET101-1	Learning Skills, History and Math	72	4.5

In this course the student will learn how to succeed in their post-secondary education program by learning strategy skills such as basic computer and software application, time management, study and testing techniques, note taking and other similar skills. This course reviews the history of the power technology industry up to and including present. Also included in this course is a review of common terminology and definitions used in the industry. An overview of the components and the function of a power plant will be presented. The student will demonstrate what they have learned through written summary and hands-on identification of selected equipment. The student will learn basic math and formulas which will be encountered and used by the technician in performing daily activities. In this course the student will also learn how to read, convert and understand the metric system of measurement.

Course	Description	Clock Hours	Credit Hours
ET102-1	OSHA	48	3.0

In this course the student will learn the safety required in the field while performing tasks on the job. Lock-Out Tag-Out procedures will be learned and demonstrated. This class will approach safety from a behavioral prevention standpoint. General shop safety and material handling will be covered as well as regulation compliance. The student will learn how function safely and understand the importance of compliance when on the site at a power generation facility. Emergency Response will also be discussed and reinforced through case studies. Proper procedures and responsibilities will be learned.

Course	Description	Clock Hours	Credit Hours
ET103-1	Tools and Professional Skills	48	3.0

The student will learn the criteria used when selecting the proper tool for the task, whether it is a hand or power tool (including hydraulic wrenches). With the ability to select the proper tool, the student then will learn how to properly and safely use the tools that are essential to Energy Technology Technicians. Students will learn general shop safety and the importance of preventing damage to components when using tools. The importance of personal protective equipment is emphasized to help ensure a safe working environment. Concepts such as professional behavior on and off the job will be learned. The student will learn the proper code of conduct required to ensure success when working on the road with little or no supervision. Additional subjects learned will include how to manage expenses, the expectation of an employer regarding attendance and job performance and global etiquette when overseas. Another factor emphasized is the ability to learn from experienced technicians in the field during on-the-job training.

Course	Description	Clock Hours	Credit Hours
ET104-1	Precision Measuring and Rigging	72	4.0

The student will learn the proper use and interpretation of precision measuring devices such as micrometers, calipers, depth gauges and gap measuring devices. This course will include both standard and metric tooling to teach the student about the equipment that will be encountered in the field. The student will learn basic skills based on standard industry practices. Safety will be emphasized and will prepare the student to participate in lifting and rigging on-the-job training when they enter the power generation field. The student will demonstrate the skills they have learned by participating in an actual lift operation.

Course	Description	Clock Hours	Credit Hours
ET107-1	DC Electrical Theory	60	3.5

In this course the student will learn electrical theory and principles, and their application to power generation systems. This course is designed to teach the student electrical circuit diagrams, including charging and storage functions. This will include circuit operation and electrical fundamentals, which will prepare the student for basic electrical functions and troubleshooting. Generator design and operation will be demonstrated and learned. Students will also learn basic electricity concepts and schematic interpretation.

Course	Description	Clock Hours	Credit Hours
ET108-1	AC Electrical Theory	60	3.5

In this course the student will learn AC 3-phase electrical theory and principles, and their application to power generation systems. This course is designed to teach the student about AC electrical circuit diagrams, including solid state devices and logic functions. This will include electrical component operation and electrical fundamentals needed for advanced electrical functions and troubleshooting.

Course	Description	Clock Hours	Credit Hours
ET213-1	Three-Phase Theory	84	5.0

Building on the principles learned in previous electrical courses, the student will be introduced to three-phase electric power, a common method of alternating-current electric power generation, transmission and distribution. The student will learn about three-phase motors and the concepts of WYE and DELTA three-phase configurations will be explored. Additional material covered will include electrical schematics and stand-by power systems.

47 Course Descriptions

Course	Description	Clock Hours	Credit Hours
ET106-1	Inspection	36	2.0

In this class the student will learn various inspection techniques employed in the field. These inspection techniques will include visual, borescopic and dye penetrant. Advanced methods such as eddy current and magnetic particle will be demonstrated. The importance of recognizing degrees of damage and distinguishing between negligible and serious flaws will be learned. The student will demonstrate what they have learned by inspecting various valves and other assigned power equipment.

Course	Description	Clock Hours	Credit Hours
ET109-1	Climb and Rescue	54	3.0

In this class the student will learn the hazards involved when climbing a wind turbine tower. The student will learn safety issues such as where and when to take a rest period during the climb. Emergency measures such as rescue from a tower will be learned and demonstrated. The student will demonstrate what they have learned by performing a safety inspection on a given piece of climb equipment correctly.

Course	Description	Clock Hours	Credit Hours
ET110-1	Wind Turbine Operation	66	4.0

This course is an introduction to the function and design of wind turbines in the power generation field. The material covers the relationship between the mechanical, electronic and wind energy used to operate, control and maintain wind turbines. Students will study the terminology used in the industry, basic tools and techniques.

Course	Description	Clock Hours	Credit Hours
ET111-1	Wind Turbine Components	60	3.5

Student will be introduced to the identification and analysis of the components and systems of wind turbines. Wind turbine blades, generators, hydraulic systems, electrical systems, gear boxes will be discussed. Students will learn and practice repair, preventative maintenance and troubleshooting.

Course	Description	Clock Hours	Credit Hours
ET112-1	Renewable Energy Sources	60	3.5

Students will be introduced to renewable energy sources other than wind power. The student will examine the technology for solar, biomass, geothermal, hydroelectric and fuel cell energy. Topics include efficiency of photovoltaic cells and solar arrays; biomass to energy and algae generation of petroleum products and hydrogen gasses; geothermal systems; generation and distribution of hydroelectric power and fuel cell operations and applications.

Course	Description	Clock Hours	Credit Hours
ET113-1	Gas Turbine and Co-Generation Operation	66	4.0

In this course the student will learn about gas turbine engines beginning with the history of the development of turbines followed by a study of the major sections of a typical turbine engine. Common accessories employed by gas turbine engines will be presented and discussed. Instrumentation and control systems will be learned and examined to help determine proper performance and assist in troubleshooting skills. The efficiencies derived from combined cycle power generation will be learned by the student. The student will demonstrate what they have learned through identification and explanation of the major components found in a co-generation facility.

Course	Description	Clock Hours	Credit Hours
ET114-1	Gas Turbine Maintenance	54	3.0

In this course the student will learn about scheduled and nonscheduled maintenance required for gas turbines. The student will also learn about the overhaul process discussed and demonstrate their skill by performing assigned hands-on tasks.

Course	Description	Clock Hours	Credit Hours
ET115-1	Boiler Operation	60	3.5

In this class the student will learn the water treatment process used in power generation systems. The student will learn the need for water treatment and the process used to comply with state and federal guidelines to protect the environment. Safety is reinforced in this course and HAZMAT is introduced to the student. In this class the student will learn the basic operation and design of boiler systems. The safety required for high pressure and high heat systems will be explained and reinforced through case studies. Fundamental operation and physics will be explained and demonstrated. Emergency procedures will be incorporated in this training.

Course	Description	Clock Hours	Credit Hours
ET116-1	Steam Operation	60	3.5

In this course the student will learn about steam turbines beginning with the history of the development of steam turbines followed by a study of the major sections of a typical steam turbine. Common accessories employed by steam turbines will be presented and discussed. Instrumentation and control systems will be explained and examined to help determine proper performance and assist in troubleshooting skills. This course is designed to develop an understanding of the scheduled and nonscheduled maintenance required for steam turbines. The overhaul process will be discussed with hands-on demonstrations and will further foster an understanding of the steam turbine operation.

48 Course Descriptions

Course	Description	Clock Hours	Credit Hours
ET209-1	Process Systems and Components	60	3.5

In this class the student will learn process plant drawings and diagrams from a systems point of view. The concept of system integration will be emphasized as the student learns how systems interact with each other. The student will learn at an introductory level how to perform basic pipefitting operations. Heat sources used in process technology will be identified and explained to the student. The students will also learn about the theory of operation utilized in heat exchangers.

Course	Description	Clock Hours	Credit Hours
ET210-1	Refining Process and Energy Platform Service Technician	60	3.5

In this class the student will learn about the basic principles of distillation systems, extraction/separation systems and chemical reactor systems. This will include catalytic cracking, hydrocracking, distillation columns, absorbers and the scrubbing process. The student will demonstrate what they have learned through assigned hands-on projects in the lab. The student will learn the safety rules and practices found on an energy platform such as a drilling operation. Technology used on an energy platform will be learned by the student such as preventative equipment maintenance, forced maintenance and troubleshooting. Technology such as fracturing and slant drilling will be learned as well.

Course	Description	Clock Hours	Credit Hours
ET211-1	Compression Technology	30	1.5

In this class the student will learn an overview of the various pieces of compression equipment found in industry. Specific equipment such as screw, piston and centrifugal compressors will be examined. The basic theory behind compression and the equipment used to achieve this goal will be discussed, diagramed and learned by the student. Standard inspection and preventative maintenance practices will be demonstrated and practiced in this class. The selection and use of proper tooling and standard maintenance practices will be emphasized in this course. The student will demonstrate what they have learned by completing assigned hands-on projects in the lab.

Course	Description	Clock Hours	Credit Hours
ET214-1	Materials, Processes, Welding and Advanced Troubleshooting	90	5.0

In this course the student learns to recognize, properly select and use a variety of hardware and materials used in the repair and maintenance of power technology equipment. Proper filing and honing techniques are demonstrated. Students will demonstrate what they have learned by identifying and installing specialty hardware such as Heli-Coil inserts as well as become proficient at the use of easy outs and drilling without damaging the surrounding structure. Skills learned will include standard practices such as safety wire and the use of torque wrenches. Basic Composite Identification will be included in this training. The student will learn how to weld safely and the techniques used in a maintenance environment.

Skills such as heating bolts and components without doing damage to the materials is learned and demonstrated. Basic skills such as how to successfully complete a tack weld is demonstrated and practiced by the student. Proper heating and installation of bolts is also learned in this course. Specific procedure when accomplishing "hot work" will also be learned. Further, the student will learn the concept of troubleshooting from a theoretical position. Input and output into a situation is examined and a logical flow is developed to determine the critical path of failure. The student will demonstrate what they have learned through the use of mock-ups and other pieces of equipment with known faults in an economical manner. In this class the student will learn an overview of the operation and design of diesel power plants. The specific application to standby power for diesel will be emphasized. Inspection, preventative maintenance and troubleshooting will be explained and demonstrated. Subsystems such as fuel control and emissions will also be included in this training. The student will demonstrate what they have learned by performing assigned hands-on project in the lab.

General Education Section

Course	Description	Clock Hours	Credit Hours
GE110-3	Mathematics	40	4.0

This course introduces algebraic, geometric and trigonometric concepts. Topics include: a review of the fundamentals of fractions, decimals and percentages; terminology and applications of geometry; measurements and conversions; algebraic expressions, equations, and formulas; ratio and proportions; summary graphs and charts; and an introduction to right triangle trigonometry.

Course	Description	Clock Hours	Credit Hours
GE111-3	English Composition	40	4.0

This course teaches students to write effective academic essays for various audiences. Students develop written communication skills with emphasis placed on the principals of effective communication, which includes, understanding the writing process, critical reading and logical thinking skills. In addition to reviewing the writing process, students learn research techniques, citation techniques, documentation formats and critical analysis of written topics.

Course	Description	Clock Hours	Credit Hours
GE112-3	Public Speaking	40	4.0

This course provides the student with a basic understanding of public speaking and how to prepare and present a variety of speeches. This course will enhance the student's communication skills particularly in a business setting.

Course	Description	Clock Hours	Credit Hours
GE113-3	Introduction to Sociology	40	4.0

This course explores sociological processes that underlie everyday life. The course focuses on globalization, cultural diversity, critical thinking, new technology and the growing influence of mass media.

49 Course Descriptions

Course	Description	Clock Hours	Credit Hours
GE114-3	Environmental Sciences	40	4.0

This course explores the relationship between man and the environment. Students examine balance between natural resources and the needs of mankind. Students explore the scientific, political, economic and social implications of environmental science.

Course	Description	Clock Hours	Credit Hours
GE115-3	Organizational Behavior	40	4.0

This course examines organizational theory and application. A comprehensive review is made of individual, group and organizational performance in relation to organizational structures in contemporary business settings.