



Course Offerings

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GPAllied is the most diverse reliability and operations consulting and services company in the world. Combined, our unrivaled technical expertise, solutions portfolio and global reach help you achieve rapid bottom-line improvement and sustained cultural change.

GPAllied diversity and expertise result from joining together firms with experts in Maintenance and Reliability, Operational Excellence, and Workforce Development. This winning team allows us to offer you expertise in the fields of Lean, Reliability Engineering, Six Sigma, Condition Monitoring, Change Management, Maintenance Planning and Scheduling, Workforce Development and Maintenance Craft Skills training. However, only *GPAllied* can offer you solutions that fully integrate these specialties.

To ensure that *GPAllied* provides you with latest thinking and proven best practices, we have attracted recognized experts to our team, benchmarked best-in-class operations and connected with thought leaders throughout the industry. Furthermore, we ensure that our project team members have technical expertise, as well as expertise as trainers and mentors through a rigorous qualification process and the establishment of work execution standards.

***GPAllied* has modeled their deliverables based on the following core beliefs:**

- The reason our clients are in business is to make money
- The first step to ensuring profitability is to have reliable “systems”
- The term “system” speaks to the combination of the people who operate the equipment, the processes they follow to operate the equipment and the equipment itself
- The definition of reliable is: the ability to perform a given task, at a stated rate, for a given period of time, under a given set of circumstances
- The organization must be motivated and prepared for any change to be sustainable
- Having successfully attained reliability, sustaining the improvements is paramount to on-going success
- Optimization is achieved through the use of a culture of continuous improvement
- Clients require a rapid return on investments

To that end, GPAllied offers you a complete suite of solutions in the following categories:

- Sustained Reliable Operations
- Reliable Capital Delivery
- Reliable Maintenance Execution

GPAllied prides itself on two (2) things: our passion for helping the client and the flexibility of delivery methods.

Our passion is driven by *the satisfaction of seeing our company help our customers build, utilize and realize the power of the Return on Asset Reliability (ROAR™).*

Our flexibility in delivery methods comes in any one of four (4) different ways. Each way specifically customized to meet the unique needs of the client. Those four (4) ways are:

Training

GPAllied offers all of our deliverables as classes for the client who prefers to implement using their own people.

Coaching

For the client who wants more than a training solution, but still prefers to implement using their own personnel, GPAllied offers a combination training/coaching package. The training class is augmented by a regimen of coaching and mentoring by our experienced consultants.

Services

Some clients prefer to contract out certain functions. GPAllied can deliver our services to the client in one of two forms:

- Project Based – GPAllied personnel are on-site for the duration of the project
- Full Time Equivalent (FTE) – GPAllied personnel are on-site, full time as contracted employees

Consulting

Whether you are starting a major change initiative or looking for the best way to improve performance, GPAllied's consultants guide you as you set your direction, design and deploy your approach, and realize results.

The GPAllied vision is to be the premier global provider of sustainable transformation driving improved customer operational and reliability excellence. To that end, we believe the best way to make our vision a reality is to optimize customer business performance through customized solutions utilizing our experienced people, innovative processes, and proven technologies.



Thus achieving operational and reliability excellence sustained through the use of cultural change management with the relentless pursuit to deliver the highest return on investment.

GP*Allied's* expert team provides unparalleled solutions. You can count on us to provide the following:

- A strong foundation to ensure that your organization's systems reliably meet customer needs with lower cost
- A roadmap to build upon that foundation to streamline your processes and help you achieve a culture of sustained continuous improvement
- Effective training to develop your people
- Consultants and trainers with technical expertise, interpersonal skills, and drive to work effectively with your team
- Solutions customized to fit your needs, drawing from a diverse range of methods and services
- A rapid return on your investment

Training Classes

At GP*Allied*, we understand that you are not interested in "training for training's sake". You need hard-hitting, impactful training that addresses the specific need of your employees, delivers value for your training dollars, and produces bottom-line results.

That's what we deliver.

In today's increasingly competitive business environment, your training investment only makes sense if it yields a tangible improvement in KPI's like:

- Production efficiency
- Employee retention
- Labor costs
- Asset downtime
- Safety
- Quality control

With over 200 courses that can be easily customized to your equipment and processes, we are the one-stop shop for all of your technical and change management training needs. We offer these classes on-site at your facilities, for your employees; or periodically around the world on an open-enrollment basis.

When you select us for your training, you receive:

- Training from practitioners and implementers who are also skilled trainers.
- Courses designed with your learning objectives in mind using professional instructional system design combined with our subject-matter expertise.

You can obtain most of the courses in a format that works best for you:

- **Off the Shelf**— you can select our standard training if a generic course suits your needs.
- **Customized** — you can ask us to make minor modifications to better fit your organization's existing terminology and culture (which we can do quickly and cost-effectively), or you can ask us to develop a truly custom curriculum.

- **Public Courses** — you may decide to attend one of our expanding list of publicly offered courses, including those offered through Macomb Community College Workforce Development Institute in Warren, MI.
- **e-Learning** — for certain courses; you can select e-Learning, or a blended solution of e-Learning, instructor-led training, and coaching.

Basic Electricity – Direct Current

DESCRIPTION

This course provides information on the basic concepts of DC electricity and magnetism, including electrostatics, basic circuit concepts, measurement of electrical quantities and associated numerical concepts, Ohm's Law, practical circuits, electromagnetism, and electrical measurements. There are hands-on exercises device operation and simple circuit construction and analysis. Upon completion of this course, the participants will be able to explain the function and operation of DC electrical devices, and the function and characteristics of basic DC circuits.

RECOMMENDED AUDIENCE

This course is recommended for electrical maintenance technicians.

YOU WILL LEARN:

- Define and explain the following technical terms; alternating current (AC), insulators, atom, iron, compound, molecule, conductors, neutron, direct current (DC), polyphase AC, electricity, proton, electron, rectifier, electronics, single-phase AC, and element.
- Give examples of elements and compounds.
- Sketch a simple atom and label its parts.
- State the law of attraction and repulsion related to electrical charges.
- Name the three basic parts of an atom.
- Explain the difference between atoms and molecules.
- Distinguish between AC and DC.
- Define and explain the following technical terms; dry cell, primary cell, efficiency, P-type silicon, electrode, secondary cell, electrolyte, semiconductor, electromagnetic induction, solar cell, N-type silicon, thermocouple, Photoconductive, thermoelectric effect, Photon, thermopile, Photovoltaic, ultrasonic, piezoelectric effect, and wet cell.
- Describe six different principles of energy conversions employed in the generation of electricity. An example of each conversion process should be given.
- Discuss and explain six different principles of energy conversion in the practical utilization of electrical energy.
- Define and explain the following technical terms; electroscopes, potential energy, electrostatic induction, selenium, electrostatics, smoke precipitators, foot-pound joule, Van de Graff generator, lightning arrester, and voltage.
- Recognize potentially dangerous situations involving electrostatic induction.
- Give examples of nuisance aspects of static electricity.
- Discuss some useful applications of static electricity.
- Draw, from memory, the pattern of an electrostatic field between like and unlike charges.

- Define and explain the following technical terms; ampere (A), fuse, circuit breaker, load, closed circuit, ohm (Ω), control, open circuit, conventional current, resistance (R), coulomb, schematic, current (I), short circuit, electromotive force, source, electron current, and volt.
- Draw a schematic diagram of a simple circuit.
- Use correct circuit notation to describe the values of voltage, current, and resistance.
- Differentiate between conventional current flow and electron current flow.
- Explain the concept of a short circuit.
- Observe proper safety precautions in working with electrical circuits.
- Define and explain the following technical terms; giga-, milli-, kilo-, nano-, mega-, pico-, and micro-.
- Express decimal numbers in powers of 10 and vice versa.
- Convert any number into scientific notation.
- Round off numbers to three-digit accuracy.
- Express any number with any appropriate metric prefix.
- Convert numbers with metric prefixes into decimal numbers or scientific notation.
- Perform the basic arithmetic operations (add, subtract, multiply, and divide) with numbers expressed in powers of 10.
- Define and explain the following technical terms; ammeter, ohmmeter, analog meter, range, digital meter, range switch, DVM, scale, linear, voltmeter, multiplier, VOM, nonlinear, and VTVM.
- Choose the proper instrument for the measuring task.
- Connect a meter correctly to the circuit.
- Read and interpret meter scales accurately.
- Define and explain the following technical terms; American Wire Gauge (AWG), Nichrome, circular mil, potentiometer, color code, resistivity, conductance, rheostat, conductivity, semiconductors, conductor, specific resistance, insulators, temperature coefficient mil, wattage rating, and mil-foot.
- Name various materials classified as either good conductors, poor conductors, or insulators
- Explain the four factors that determine the amount of resistance in a wire
- Discuss the aspects of conductivity and resistivity
- Perform computations involving the resistance equation
- Use the charts and tables in this chapter
- Compare wire sizes using the American Wire Gauge
- Determine the correct values of resistors by using the color code
- Describe the interrelationship of voltage (E), current (I), and resistance (R)
- Apply Ohm's law in calculating an unknown circuit quantity
- Use Ohm's law in conjunction with metric prefixes
- Define and explain the following technical terms; Btu, kilowatt-hour (kWh), efficiency, kinetic energy, foot-pound, potential energy, force, power (P), horsepower (hp), watt (W), I^2R losses, watt-hour (Wh), joule (j), and work.
- Calculate the power dissipation of a resistor
- Use the power equation in conjunction with Ohm's law to find an unknown circuit quantity

- Explain the derivation of the formulas embodied in the PIRE wheel
- Calculate the cost of electrical energy expended by a load
- Define and explain the following technical terms; ground, series-opposing, series-aiding, voltage divider, series circuit, and voltage drop.
- Describe and explain the behavior of voltage, current, resistance, and power in a series circuit
- Write four mathematical statements describing the relationships of E, I, R, and P in a series circuit
- Calculate unknown components and/or circuit quantities in a given series circuit
- Identify correct polarity with respect to a common reference point (ground)
- Determine the next voltage from series-connected voltage sources
- Explain five different methods of computing the total resistance of a parallel circuit.
- Compute any unknown circuit quantity in a parallel circuit having sufficient data.
- Define and explain the following technical terms; bleeder resistor, loaded voltage divider, equivalent resistance, unloaded voltage divider, heavy load, and voltage regulation.
- Identify the series-connected and parallel-connected components of a complex circuit
- Simplify complex circuits by redrawing them with resistor values equivalent to their series and parallel combinations
- Write and explain Kirchoff's voltage and current laws
- Apply Kirchoff's laws in the solution of complex circuits
- Design voltage divider circuits to meet specific load conditions
- Define and explain the following technical terms; anode, electrolysis, arcs, electrolyte, cathode, negative ion, cathode ray, positive ion, cathode-ray tube, and sparks.
- Describe how the ionization of liquids differs from that of gases.
- Explain some useful processes that depend on conduction in liquids and gases.
- Define and explain the following technical terms; alnico, Maxwell, ampere-turns, Oersteds, coercive force, paramagnetic, diamagnetic, permalloy, eddy current, permeability, ferromagnetic, powder metallurgy, flux, reluctance, flux density, residual magnetism, gauss, retentivity, gilbert, saturation, hysteresis, sintering, magnetic domains, solenoid, magnetizing intensity, tesla, magnetomotive force, and weber.
- Correctly employ the graphic representation associated with electromagnetism
- Predict magnetic polarity and/or direction of current by use of left-hand rules
- State the law of magnetic attraction and repulsion
- Explain the factors determining the strength of an electromagnet
- Define and explain the following technical terms; generator action, playback head, micron, recording head, motor effect, relay, normally closed contact, relay ladder logic, normally open contact, and solenoid.
- Describe the uses and applications of solenoids.
- Draw a functional circuit diagram involving a control relay.
- Explain how electromagnetism can produce vibrating motion.

- Differentiate between the motor effect and generator action of conductors within a magnetic field.
- Name and describe some industrial applications of electromagnetism.
- Define and explain the following technical terms; analog meters, ohms per volt rating, d'Arsonval meter, sensitivity, digital instruments, shunt resistor, galvanometer, Wheatstone bridge, megohmmeter, and multiplier.
- Describe and explain the operating principles of voltmeters, ammeters, ohmmeters, wattmeters, megohmmeters, and Wheatstone bridges
- Calculate the value of shunt resistors to extend the range of an ammeter
- Calculate the value of multiplier resistors to extend the range of a voltmeter
- Compute an unknown resistor from the settings of a Wheatstone bridge
- Define and explain the following technical terms; commutator, oscilloscope, cycle, prime mover, frequency, sine wave, induction, slip rings, and Lenz's law.
- Explain the principle of electromagnetic induction
- Predict the direction of induced EMF by Fleming's left-hand rule
- Discuss the meaning of Lenz's law
- Describe the induction process within rotating generators
- Define and explain the following technical terms; electro-dynamometer, tachometer, neutral plane, torque, Prony brake, and torque arm.
- Describe how torque is developed in an elementary motor
- Explain the purpose of commutators in DC motors
- Determine the direction of rotation of an armature, given the direction of the magnetic field and the current through the armature
- Perform correct calculations involving torque and horsepower

CLASS DURATION

Up to 100 hours (depending upon audience and audience experience)