VECTOR SM UNIVERSITY

2023 COURSE CATALOG

Endress+Hauser

People for Process Automation

VECTOR UNIVERSITY

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VECTOR SM
UNIVERSITY

ABOUT VECTOR UNIVERSITY

Vector University is facilitated by experienced trainers currently working in the process industry. Our team is dedicated to training you on the most up to date technologies and best practices to keep your processes running safely and efficiently. Course offerings include: **Basic and Advanced Instrumentation, Fire and Gas, Advanced and Gas Analytics and Safety**. Visit our full schedule of course offerings with detailed information on each session and pricing. Class sizes are limited so reserve your seat now to join us!

A MESSAGE FROM JOSH SIMS, VP OF SERVICE SOLUTIONS

"Vector University serves the process automation community by providing professional development opportunities that increase knowledge, technical skills, and competency. We offer hands-on lab experience to automation professionals so they can build essential skills to increase professional development."

PROFESSIONAL DEVELOPMENT HOURS

Vector University offers Professional Development Hours (PDH) for all courses attended to help with your continued education needs. Below is a chart that identifies each course hours and is referenced on each page.

VECTOR SM

vectorcag.com/vector-university
800-969-5678 • info@vectorcag.com
14517 Kirby Drive, Pearland, TX 77047

All courses are taught at the Houston Campus in the brand new, state-of-the-art PTU® (Process Training Unit).

MEET OUR TRAINERS

We have many experienced Training Instructors currently working in the process industry. The training staff has years of hands-on, practical experience with all aspects of their respective field expertise. Unlike instructors that other organizations may employ, our training staff is regularly involved in all aspects of the technology, to ensure that we can convey in a practical manner, the information our Student / Client needs to know. All Training Instructors have 10+ years of engineering, project, or field experience and are considered industry experts in their field of study.

SCOTT CHILDS

Trainer / Service Engineer
Vector CAG

Scott Childs has spent the last 38 years working with instrumentation in the field service industry, performing process measurement and control support. During this time, he managed jobs, projects, people, performed start-ups, provided consultation for customers, calibrated instrumentation, provided customer training and helped trouble-shoot various difficult application and instrumentation issues to help customer achieve their process measurement requirements and needs. His career although very diverse, has involved spending time in almost every type of product manufacturing plant, which has given him a very broad knowledge of how different industries operate and ideas that can be carried over from one industry to another, to resolve similar process measurement issues. The time spent within these industries, has been very helpful in understanding what instruments work best in various applications and how and where to install them to achieve the best results. This allows him to teach through experience and pass his knowledge onto others.

CHRIS FOURNET

Trainer / Senior Application Specialist
Vector CAG

A professional with over 31 years of instrumentation experience, Chris Fournet will excite you with his wit and wisdom. Instrumentation is not only a job for Chris but a passion. He loves all aspects of the industry and enjoys helping the sales team and customers solve problems. Chris graduated with a Associate of Applied Science in Electronics and Instrumentation from Lamar University. Additionally, he is certified from the Instrument Society of America (ISA) Certified Control Systems Technician (CCST) and earned Endress+Hauser's Black Belt in Level, Pressure, Temperature and Service. He has obtained much of his experience working 22 years for Motiva as well as past positions with Texaco Research and Texaco Chemical. In 2014 he joined the Vector CAG family as Senior Application Specialist. His Vector University training focus is on Instrument 101/102, Level 101/102, Pressure, Temperature and Williamson Flare Products. He also provides other technical support to our sales team and customers. In his free time, he enjoys playing in the dirt; riding dirt bikes, 4 wheelers and side by sides.

STEVE SMITH

Owner, Consultant and Sr. Instructor
Smith Analytical

Forty years working in the field of analytical instrumentation in a variety of positions. Of this time, 22 years handling day to day operations for three different analyzer organizations Steve has owned or held ownership interest in. Steve is the founder of Advanced Analytical Solutions, LLC (1993-1997) and most recently Smith Analytical, LLC (2012 – Current). Prior to the sale of Process Analytical Applications, Inc. (PAAI) to Cameron in 2008, Steve had ownership interest in PAAI. Steve has been directly involved in handling over $125M USD in analytical projects, in addition to 25 years of experience teaching analytical instrumentation courses at the college level and to Clients all over the world.

VECTOR UNIVERSITY FREQUENTLY ASKED QUESTIONS

REGISTRATION

You may register for any of the courses listed by going to our website https://vectorcag.com/vector-university/#register

COST

Course costs are listed on each individual description page. All course costs include training materials and meals (breakfast, lunch and snacks) during the training day.

CANCELATION POLICY

Training is non-refundable, if you are not able to attend a training after a PO has been submitted, you will have the option to reschedule at a later date when class is provided again. Classes can be substituted for another class of equal amount.

LOCATION

All courses are taught at the Houston Campus in the brand new, state-of-the-art PTU® (Process Training Unit). Parking is complimentary.

14517 Kirby Drive
Pearland, TX 77047

AIR TRAVEL AND HOTEL

There are 2 airport options for air travel to the Houston Campus.

- William P. Hobby Airport (HOU) - 12 Miles
- George Bush Intercontinental Airport (IAH) - 45 Miles

There are many hotel options close to the Houston Campus.

- Hilton Garden Inn - 1.8 Miles
- Holiday Inn Express - 3 Miles
- SpringHill Suites by Marriott - 2.8 Miles

CUSTOM TRAINING

A custom training course can be created to fit your specific need at your facility. If you are interested in a custom training session please send your request to training@vectorcag.com.

OTHER QUESTIONS?

Please contact training@vectorcag.com or 800-969-5678.

COURSE OFFERINGS

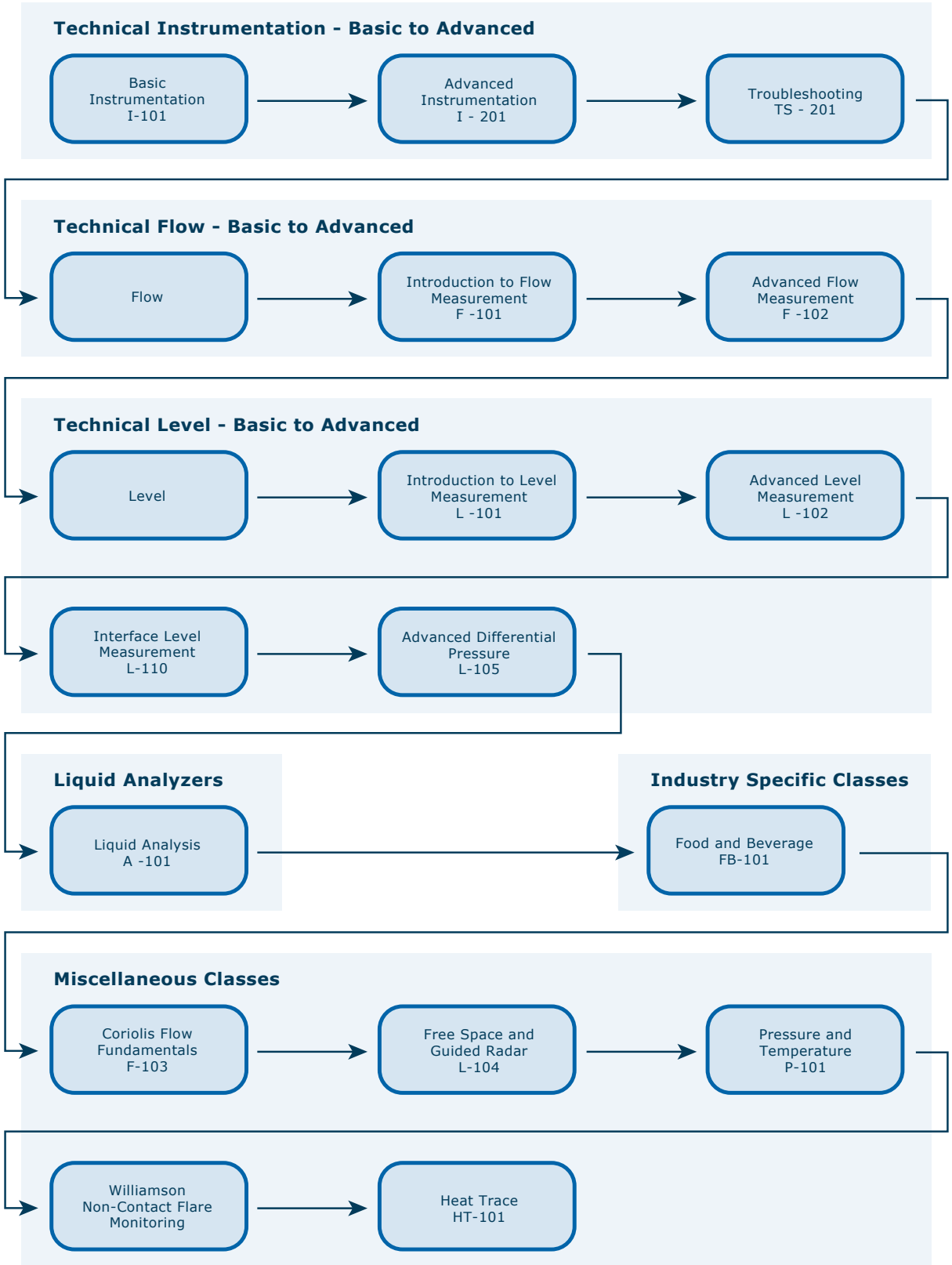
INSTRUMENTATION

VECTOR SM UNIVERSITY

TRAINING PROGRESSION PLAN

The following is the recommended training outline track for companies who would like to have experts on Instrumentation or would just prefer to have a Flow or Level Expert.

INSTRUMENTATION TECHNICIAN / ENGINEER – TRAINING PROGRESSION OUTLINE



BASIC INSTRUMENTATION (I-101)

PURPOSE

4-day hands-on course where students will be exposed to a variety of instrumentation used in the field.

DESCRIPTION

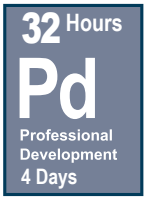
This hands-on course on instrumentation will start by providing maintenance and engineering personnel with a basic understanding of wiring, signals, instrumentation technologies, applications, and installations. All the common instruments found in today's process industries will be examined from a view applicable to virtually any manufacturer's equipment operation, installation, start-up and calibration. Typical troubleshooting procedures for instrumentation will be covered and practiced, along with plenty of hands of labs. By the time the student completes this course, they will have a very well-rounded understanding of all that is needed to start up and troubleshoot virtually any instrument, which will keep any plant process down time to a minimum. The class will be a combination of classroom and hands-on training on a PTU® (Process Training Unit).

COURSE OBJECTIVES

- Process Control Terms and Technologies
- Common Control Signals
- P&IDs Basics
- Temperature Instruments
- Differential Pressure Transmitters
- Time of Flight Level Instruments (Radar/Ultrasonic)
- Tuning Fork Technology
- Flow Basics
- Coriolis Flow Meters
- Electromagnetic Flow Meters
- Vortex Flow Meters
- Ultrasonic Flow Meters
- Installation, Start-up and Commissioning

COST

$2,975 per person



ADVANCED INSTRUMENTATION (I-201)

PURPOSE

This is a 4-day advanced hands-on course where students will be exposed to a variety of flow and level instruments used in the field. This class will also include more labs on process-related issues and how to correct them.

DESCRIPTION

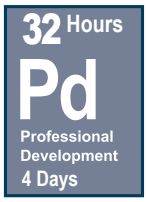
This course provides a deeper understanding of numerous Flow and Level technologies, advancing the students' knowledge beyond the information learned in the I -101 Basic Instrumentation Class. This is accomplished by providing them with additional flow and level technologies, process related issues and instrumentation filter settings. Additionally, there will be an emphasis on in-depth understanding of Time of Flight, ToF technologies and envelope curves along with implementing proper techniques of configuration, calibration, and troubleshooting. All of this information learned will improve the students' knowledge to keep things running efficiently. The class will be a combination of classroom and hands-on training on a PTU® (Process Training Unit).

COURSE OBJECTIVES

- DP Flow
- Coriolis Meter - Mass Zero Point Troubleshooting
- Understanding Flow Measurement Settings and Filters
- Entrained Air - Problems and Solutions
- Gas Measurement Basics
- Thermal Mass Flow Metering
- Open Channel Flow
- Free Space and Guided Wave Radar Level Transmitters
- Understanding Echo Curves, Mapping and Filter
- Installation, Start-up and Commissioning
- Service and Repair

COST

$2,975 per person



INTRODUCTION TO FLOW MEASUREMENT (F-101)

PURPOSE

This is a 2-day hands-on course where students will be exposed to a variety of flow instruments used in the field.

DESCRIPTION

The class will start by providing instrument techs and engineers with a brief section on the basic understanding of numerous flow technologies. Following this introduction, we will proceed with in-depth training on vortex, magnetic, ultrasonic and Coriolis flow meters. The class will be a combination of classroom and hands-on training on a PTU® (Process Training Unit).

COURSE OBJECTIVES

- Flow Basics and Advanced Flow Metering
- Differential Pressure Flow Measurement
- Coriolis Flow Meters
- Electromagnetic Flow Meters
- Vortex Flow Meters
- Ultrasonic Flow Meters

COST

$1,675 per person

16 Hours
Pd
Professional Development
2 Days

ADVANCED FLOW MEASUREMENT (F-102)

PURPOSE

This is a 2-day advanced hands-on course where students will be exposed to a variety of flow instruments used in the field. This class will also include more labs on process-related issues and how to correct them.

DESCRIPTION

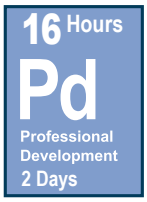
This course provides a deeper understanding of numerous Flow technologies, advancing the students knowledge beyond the information learned in the F-101 Class. This is accomplished by introducing them to additional flow technologies for gas measurement and open channel flow, along with further training on Coriolis, Mag, Vortex and Ultra Sonic Flow Meters. Solutions will also be taught for process related issues and there will be an emphasis on in-depth training on instrumentation filter settings. The class will be a combination of classroom and hands-on training on a PTU® (Process Training Unit).

COURSE OBJECTIVES

- DP Flow
- Coriolis Meter - Mass Zero Point Troubleshooting
- Understanding Flow Measurement Settings and Filters
- Entrained Air - Problems and Solutions
- Gas Measurement Basics
- Thermal Mass Flow Metering
- Open Channel Flow
- Installation, Start-up and Commissioning

COST

$1,675 per person



CORIOLIS FLOW FUNDAMENTALS (F-103)

PURPOSE

This is a 1-day class that provides you with a basic understanding of the Coriolis principle.

DESCRIPTION

This is a fundamental course for Coriolis mass flow technology for maintenance technicians. We will dedicate one day to Coriolis technology to give you an in-depth understanding of this flow measurement technology.

COURSE OBJECTIVES

- Coriolis Flow Principles
- Sensor Design, Internal Parts and Electronics
- Coriolis Meter Installation Guidelines
- Field Tooling
- Start-up and Commissioning
- Zero Point Problems and Solutions
- Density Measurement
- Entrained Air
- Troubleshooting and Repair

COST

$925 per person

8 Hours
Pd
Professional Development
1 Day

INTRODUCTION TO LEVEL MEASUREMENT (L-101)

PURPOSE

This 2-day course provides a basic understanding of numerous Level Measurement Technologies.

DESCRIPTION

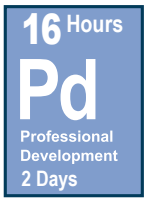
This Level Measurement course will start by providing maintenance and engineering personnel with a basic understanding of numerous level technologies. Following this introduction, we will proceed with in-depth training on Differential Pressure, Time of Flight, or ToF, technologies that include a variety of radar types as well as ultrasonic level transmitters. The class will be a combination of classroom and hands-on training on the PTU® (Process Training Unit).

COURSE OBJECTIVES

- Overview of Methods of Level Measurement Technologies
- Differential Pressure Level Measurement
- Capacitance Level Measurement
- Tuning Fork Technologies
- Time of Flight Level Instruments (Radar/Ultrasonic)

COST

$1,675 per person



TROUBLESHOOTING 201 (TS-201)

PURPOSE

This 3-Day Troubleshooting Course will start by providing maintenance and engineering personnel with a basic understanding of tools, calculation and information needed for troubleshooting.

DESCRIPTION

Following this introduction, you will spend three days with our instructor who has 38 years of field experience. This time will be spent troubleshooting many of the process and instrument related issues he has seen and re-created for you to trouble-shoot. Troubleshooting will be on all instrumentation lines, Flow, Level, Pressure and Temperature. This class will be a mixture of theory and labs, but mainly hands on labs. Feel free to bring your own Mulitmeter, laptop or hand-held instrumentation communication device (Field Xpert SMT70, 475, TREX, laptop with DeviceCare, FieldCare) or you can use one of ours. Before taking this class, the Basic Instrumentation I-101 should be completed.

COURSE OBJECTIVES

- Basic loop check-out
- Advanced loop check-out
- Fundamentals of test equipment
- Becoming more efficient at troubleshooting

COST

$2,250 per person

24 Hours
Pd
Professional Development
3 Days

ADVANCED LEVEL MEASUREMENT (L-102)

PURPOSE

This 2-day course provides an advanced understanding of numerous Level Measurement Technologies.

DESCRIPTION

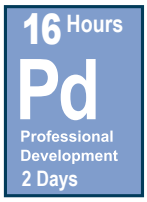
The Level Measurement course begins with a brief review of current level technologies Following the technology refresher, we will proceed to look deeper at each level measuring technology discussing then implement proper techniques of configuration and calibration and troubleshooting. There will be an emphasis on an in-depth understanding of Time of Flight, ToF technologies and envelope curves. The class will be a combination of classroom and hands-on training on the PTU® (Process Training Unit).

COURSE OBJECTIVES

- Overview of Methods of Level Measurement Technologies
- Differential Pressure Level Measurement
- Interface level
- Envelope curve analysis
- Mapping
- Time of Flight Level Instruments (Radar/GWR/Ultrasonic)

COST

$1,675 per person



FREE SPACE & GUIDED RADAR (L-104)

PURPOSE

This 2-day course combines classroom and hands-on training in the PTU® (Process Training Unit).

DESCRIPTION

This is an introductory course for Free Space and Guided Wave Radar Level for maintenance and engineering personnel. We will dedicate one day to each technology to give you a basic understanding of these level technologies. The class will be a combination of classroom and hands-on training on a PTU® (Process Training Unit).

COURSE OBJECTIVES

- Guided Radar Technology Basics
- Basic Guided Radar Setup
- Guided Radar Local Troubleshooting
- Guided Radar Setup & ToF-Tool
- Instrument Data Back-up and Saves Break
- Advanced Troubleshooting

COST

$1,675 per person

16 Hours
Pd
Professional Development
2 Days

ADVANCED DIFFERENTIAL PRESSURE (L-105)

PURPOSE

This 1-day course combines classroom and hands-on training in the PTU® (Process Training Unit).

DESCRIPTION

This advanced DP (Differential Pressure) training class starts by providing an engineering personnel with a basic understanding of DP Level and Flow technologies. Following this introduction, we will proceed to look deeper at this measuring technology discussing then implementing proper techniques of configuration, calibration and troubleshooting. The class will be a combination of classroom and hands-on training.

COURSE OBJECTIVES

- Installation
- SG Calculation
- Troubleshooting
- Orifice Plates for Flow

COST

$925 per person

INTERFACE LEVEL MEASUREMENT (L-110)

PURPOSE

This is a 1-day hands-on course where students will be exposed to a variety of interface level instruments used in the field.

DESCRIPTION

The class will start by providing instrument techs and engineers with a brief section on the basic understanding of numerous interface level technologies. Following this introduction, we will proceed with in-depth training on differential pressure and guided wave radar technologies. This class will be both classroom and hands-on training at our PTU® (Process Training Unit).

COURSE OBJECTIVES

- Different types of liquid interfaces in industry
- Discuss different types of interface technologies
- Liquid interface calculations using differential pressure
- Liquid interface calibrations using guided wave radar

COST

$925 per person

8 Hours
Pd
Professional Development
1 Day

WILLIAMSON NON-CONTACT FLARE MONITORING

PURPOSE

This 1-day course provides you with an advanced understanding of Williamson Flare Monitors and their applications.

DESCRIPTION

Interested in learning more about flare monitors and their applications? Vector University offers a 1 day hands-on course on non-contact flare monitoring specific to the needs of maintenance and engineering personnel. This class is taught on a working PTU by our factory trained instructor and Vector Sr. Application Specialist.

COURSE OBJECTIVES

- Displays and Relays
- Communication Tools & Methods
- Pilot Monitors (PM) Value-Benefit/Regulatory Requirements/Ease of Use
- Flare Monitors (FM) Environmental Concerns/Reduce Cost/Increase Productivity
- Flame Intensity Monitors (FI) Specific Field Use/Target Markets

COST

$925 per person

LIQUID ANALYSIS (A-101)

PURPOSE

This 2-day (16 hour) introductory course will start by providing maintenance and engineering personnel with a basic understanding of numerous analytical technologies.

DESCRIPTION

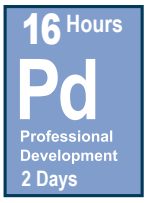
This basic portion will focus on concepts applicable to virtually any manufacturer's equipment. Following this introduction, we will proceed with in-depth training on pH, conductivity and chlorine monitors.

COURSE OBJECTIVES

- Recognize a broad variety of analytical technologies and understand the strengths and limitations of each
- Work with instrumentation specialists to specify the best type of analytical technology for a variety of applications
- Set up and commission pH and conductivity meters
- Diagnose and correct problems with pH, conductivity meters and chlorine

COST

$1,675 per person



HEAT TRACE (HT-101)

PURPOSE

This is 1-day hands-on course where students will be exposed to a variety of Heat Trace used in the industrial sector.

DESCRIPTION

This hands-on course covers the fundamentals of Heat Trace. It will start by providing why heat tracing is important to certain applications and the proper installation that is key to a successful circuit. Calculations of Heat Loss, Design of Circuits & Controller programming will be conducted through hands on labs to help understand the importance of acquiring accurate information during walkdowns. Students will assemble a pipe sculpture to perform troubleshooting methods in a hands-on lab. The class will be a combination of classroom and hands-on training at the PTU® (Process Training Unit).

COURSE OBJECTIVES

- History of Heat Trace
- Introduction into Heat Trace
- Proper installation standard
- Code requirements
- What is Heat Loss
- Manual calculations of Heat Loss
- Types of Heat Trace and selection
- Proper cable stripping
- Purpose of Accessories
- Pipe sculpture assembly
- Controls and monitoring
- Controller programing
- Information to gather for Heat Trace design
- Complete walkdown and design
- TraceCalc design
- Troubleshooting

COST

$925 per person

8 Hours
Pd
Professional Development
1 Day

FOOD AND BEVERAGE (FB-101)

PURPOSE

4-day hands-on course where students will be exposed to a variety of instrumentation used in the food and beverage industries.

DESCRIPTION

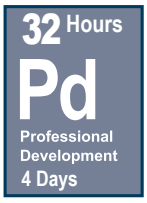
This hands-on course on instrumentation will start by providing maintenance and engineering personnel with a basic understanding of wiring, signals, instrumentation technologies, applications, and installations. All the common instruments found in today's food and beverage industries will be examined from a view applicable to virtually any manufacturer's equipment operation, installation, start-up, calibration and troubleshooting procedures. All instrumentation technologies will include a theory on the instrument, followed by a lab on that technology. By the time the student completes this course, they will have a very well-rounded understanding of all that is needed to start up and troubleshoot virtually any instrument, which will keep any plant process down time to a minimum. The class will be a combination of classroom and hands-on training on a PTU® (Process Training Unit).

COURSE OBJECTIVES

- Process Control Terms and Technologies
- Common Control Signals
- Temperature Instruments
- Pressure Fundamentals
- Differential Pressure Transmitters (Level)
- Time of Flight Level Instruments (Radar/Ultrasonic)
- Tuning Fork Technology
- Flow Basics
- Coriolis Flow Meters
- Coriolis – Mass Zero Point Troubleshooting
- Entrained Air – Problems and Solutions
- Electromagnetic Flow Meters
- Vortex Flow Meters
- Ultrasonic Flow Meters
- Analytical pH and Conductivity Measurment
- Installation, Start-up and Commissioning

COST

$2,975 per person



COURSE OFFERINGS

GAS ANALYZER

Endress+Hauser

People for Process Automation

VECTOR UNIVERSITY

BASIC GAS ANALYTICS SCHOOL (TDL101)

PURPOSE

This introductory 1-day course focuses on the extractive gas analyzers. This technology is known for its proven reliability and real time analysis to help guarantee gas deliveries, its high availability and low maintenance significantly reduces operational costs and comprehensive diagnostic systems enables reliable natural gas automation.

DESCRIPTION

This course provides instrumentation and engineering personnel with a basic understanding of TDLAS technology. We focus on the classifications of each analyzer and how each style can work within your processes. Then we head into in-depth training on analyzer hardware, software, keypad operations, passwords, parameters, loop checks, validation, commissioning and troubleshooting. The class is a combination of classroom and hands-on training with our various training instruments.

COURSE OBJECTIVES

- Identify, test and troubleshoot internal hardware
- Setup and program analyzers to your specific processes
- Commission, verify and diagnose the health of the instrument
- Troubleshoot and validate

COST

Call for Pricing

ADVANCED GAS ANALYTICS SCHOOL (TDL102)

PURPOSE

This advanced 1-day course focuses on the extractive gas analyzers. This technology is known for its proven reliability and real time analysis to help guarantee gas deliveries, its high availability and low maintenance significantly reduces operational costs and comprehensive diagnostic systems enables reliable natural gas automation. This course provides instrumentation and engineering personnel with a basic understanding of TDLAS technology.

DESCRIPTION

We focus on the classifications of each analyzer and how each style can work within your processes. Then we head into in-depth training on analyzer hardware, software, keypad operations, passwords, parameters, loop checks, validation, commissioning and troubleshooting. The class is a combination of classroom and hands-on training with our various training instruments.

COURSE OBJECTIVES

- Identify, test and troubleshoot internal hardware
- Setup and program analyzers to your specific processes
- Commission, verify and diagnose the health of the instrument
- Troubleshoot and validate

COST

Call for Pricing

8 Hours
Pd
Professional Development
1 Day

OPTICAL ANALYSIS J22 GAS ANALYTICS SCHOOL (TDL103)

PURPOSE

Optical Analysis J22 TDLAS Gas Analyzer provides an exceptionally reliable measurement.

DESCRIPTION

This 1-day course is tailored for natural gas pipeline operators and natural gas suppliers who want to meet gas quality specifications, prevent pipeline corrosion, stop hydrate formation and minimize the risk of explosion to ensure human safety and asset integrity. Hands-on technical classes are available upon request.

COURSE OBJECTIVES

- Identify, test and troubleshoot internal hardware
- Setup and program the analyzers to your specific process
- Commission, verify and diagnose the health of the instrument
- Troubleshoot and validate

COST

Call for Pricing

QUENCHED FLUORESCENCE O_2 ANALYZER SCHOOL (OXY101)

PURPOSE

This introductory 1-day course focuses on the extractive gas analyzers. This technology is known for its proven reliability and real time analysis to help guarantee gas deliveries and its high availability and low maintenance significantly reduces operational costs.

DESCRIPTION

This course provides instrumentation and engineering personnel with a basic understanding of quenched fluorescence technology. We focus on the classifications of each analyzer and how the analyzer works with your process. Then we head into in-depth training on analyzer hardware, software, keypad operations, parameters, 4-20 mA loop checks, validation, commissioning and troubleshooting. The class is a combination of classroom and hands-on training with our various training instruments.

COURSE OBJECTIVES

- Setup and program analyzers toy our specific processes
- Commission, verify and diagnose the health of the instrument
- Troubleshoot and validate

COST

Call for Pricing

8 Hours
Pd
Professional Development
1 Day

COURSE OFFERINGS

PROCESS ANALYZER

VECTOR UNIVERSITY

PROCESS ANALYZER

OVERVIEW

Analyzer technicians are highly skilled technologists that install, calibrate and maintain some of the most sophisticated instrumentation in the world. Analyzers are used in all types of refining, petrochemical and manufacturing industries, and are valuable for the control of processes and environmental compliance. Most analyzer technicians start out as instrumentation technicians who, because of their aptitude and attitude, have moved to a higher level of technology. There is a shortage of analyzer technicians throughout the United States and abroad, and the shortage will only increase as many analyzer technicians retire in the next five to ten years. Analyzer technicians enjoy excellent starting salaries and with experience, have the potential to earn annual salaries exceeding $100,000 per year.

THE METHODOLOGY BEHIND OUR TRAINING

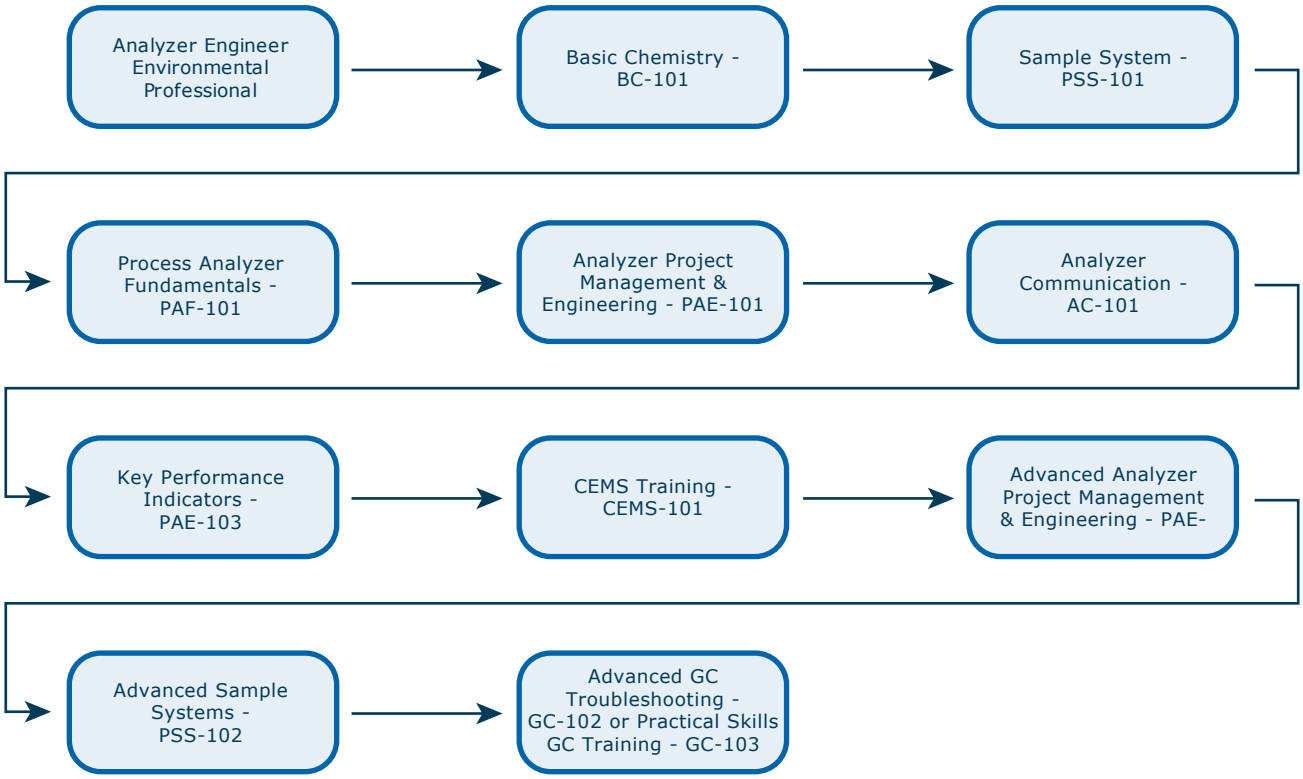
The training approach is based on principles of adult learning with a focus on peer review during all the steps of the training/learning event. The course models a variety of effective training methodologies including demonstration, practice, discussion, brain-storming, buzz groups, case studies, visualization and presentation. Once students have gained the concepts explained and demonstrated in this class, they can begin to apply their knowledge when maintaining or troubleshooting sample conditioning systems.

TRAINING PROGRESSION PLAN

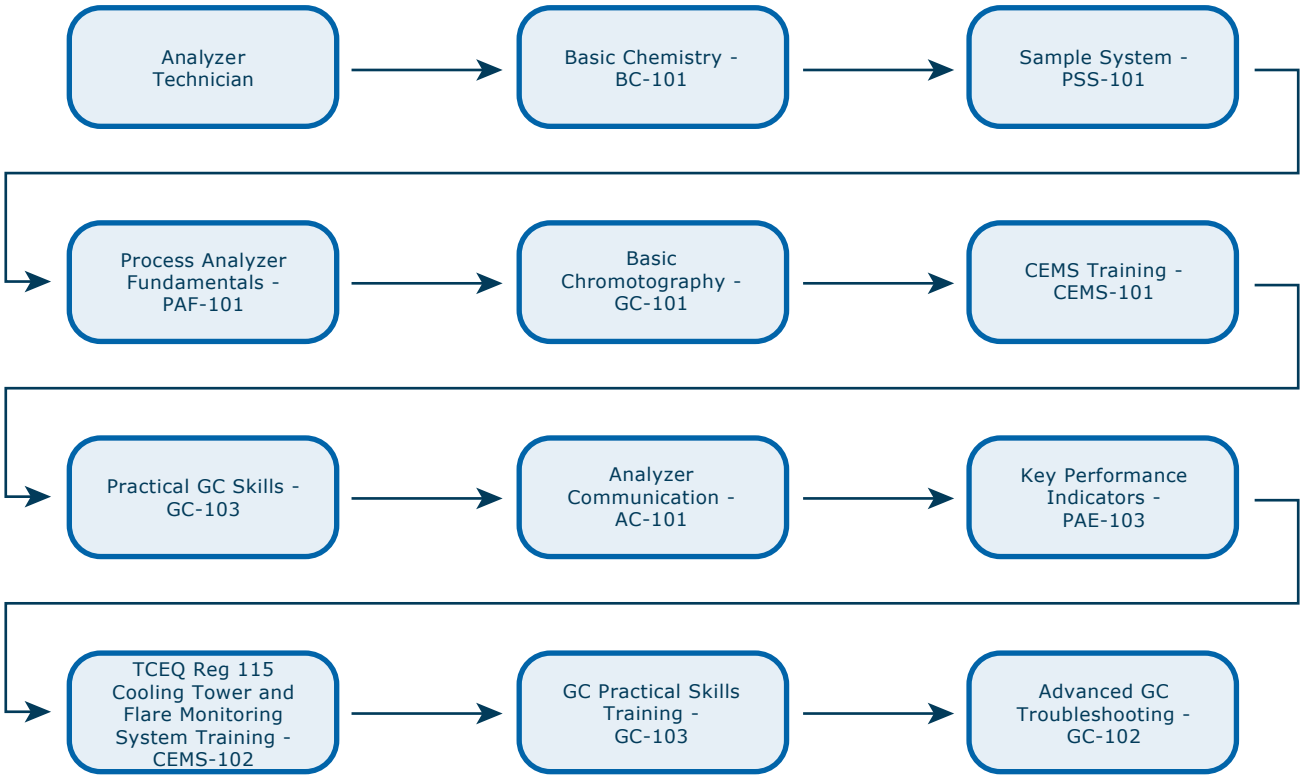
There are currently two training tracks. One is designed for Analyzer Professionals (Engineers, Designers or Environmental Professionals) and the second is for Analyzer Technicians who are looking to gain additional insight into this discipline.

ANALYZER PROFESSIONAL TRAINING LADDERS

ANALYZER PROFESSIONALS



ANALYZER TECHNICIANS



AMETEK WDG-IV OXYGEN ANALYZER

PURPOSE

The purpose of the Ametek WDG-IV Training Course is to cover fundamental concepts of oxygen in gas measurement, overview of the Ametek WDG-IV, software overview of the Ametek WDG-IV, calibration and hands-on labs with this analyzer.

AUDIENCE

The course is designed for engineers or analyzer technicians who are seeking a better understanding of high temperature zirconia oxygen measurements, the WDG-IV Analyzer and how to approach specific problems when dealing with this technology.

COURSE OBJECTIVES

1. Introduce participants to fundamentals of oxygen in gas measurement.
2. Review Ametek WDG-IV hardware.
3. Review of Ametek WDG-IV software and User Parameters.
4. Calibration of the WDG-IV Oxygen Analyzer.
5. Troubleshooting the WDG-IV Oxygen Analyzer.
6. Help participants develop a better understanding of how this information is used to maintain and troubleshoot the equipment.

STRUCTURE

7 sessions, labs, a baseline exam and final exam.

MATERIALS AND TOOLS

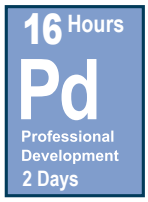
Each session includes an introduction, learning objectives, participatory methodologies, and activities. A pre/post course assessment and peer feedback form on practice sessions are included.

TIME

Sixteen (16) hours technical content.

COST

$1,701



ANALYZER COMMUNICATIONS

PURPOSE

The purpose of the Analyzer Communications Training Course is to cover fundamental concepts of analyzer networks and communication protocols used to transmit measurement data to a distributive control system (DCS) or programmable logic controller (PLC).

AUDIENCE

The course is designed for engineers or analyzer specialists who are seeking a better understanding of analyzer communications, networks and how to approach specific problems when dealing with this technology.

COURSE OBJECTIVES

1. Introduce participants to fundamentals of communication networks.
2. Review various types of communication protocols.
3. Number Systems used in computers.
4. Details for some of the common Protocols.
5. Help participants develop a better understanding of how this information is used to maintain and troubleshoot the equipment.

STRUCTURE

15 sessions, labs, a baseline exam and final exam.

MATERIALS AND TOOLS

Each session includes an introduction, learning objectives, participatory methodologies, and activities. A pre/post course assessment and peer feedback form on practice sessions are included.

TIME

Twenty-four (24) hours technical content.

COST

$2,100

24 Hours
Pd
Professional Development
3 Days

BASIC ANALYZER CHEMISTRY (BC-101)

PURPOSE

The purpose of the Process Analyzer Chemistry Training Course is to strengthen the understanding of those individuals who work with or support process analyzers on a daily basis.

AUDIENCE

The course is designed for individuals who work with process sample conditioning systems and analyzers. This course is designed for lab and analyzer technicians and other process analyzer professionals seeking a better understanding or refresher course in basic chemistry.

COURSE OBJECTIVES

1. Introduce participants to principles and concepts of basic chemistry.
2. Develop participants' capacity to read and understand basic chemical equations.
3. Equip participants with knowledge so they understand empirical formulas and can draw molecules in long hand structure.
4. Identify how basic chemistry concepts apply to process sample conditioning systems and analyzers.
5. Help participants develop a better understanding of how this information is used in their daily task.

STRUCTURE

Formal training sessions which also include a baseline and final exam.

MATERIALS AND TOOLS

Each session includes an introduction, learning objectives, participatory methodologies, and activities. A pre/post course assessment and peer feedback form on practice sessions are included.

TIME

Twenty-four (24) hours technical content presented in the formal training session.

COST

$2,100

BASIC CHROMATOGRAPHY (BGC-101)

PURPOSE

The purpose of the Basic Chromatography Training Course is to strengthen the understanding of those individuals who work with or support process gas chromatograph analyzers.

AUDIENCE

The course is designed for individuals who work with process gas chromatographs. This course is designed for engineers, supervisors and analyzer technicians seeking a better understanding of the operational theory of this technology. Students attending this training must have an understanding of basic chemistry or attended the Introduction to Basic Chemistry Training Class.

COURSE OBJECTIVES

1. Introduce participants to principles and concepts of basic chromatography.
2. Develop participants' capacity to read and understand valve diagrams.
3. Equip participants with knowledge so they understand basic operational and troubleshooting concepts.
4. Explain the operational theory of peak integration, baseline correction and calibration.
5. Help participants develop a better understanding of how this information is used in their daily task.
6. Demonstrate basic understanding of these concepts by using the Smith Analytical GC Simulator Software.

STRUCTURE

15 sessions, calibration and troubleshooting labs plus a baseline and final exam.

MATERIALS AND TOOLS

Each session includes an introduction, learning objectives, participatory methodologies, and activities. A pre/post course assessment and peer feedback form on practice sessions are included.

TIME

Twenty-four (24) hours technical content.

COST

$2,100

CONTINUOUS EMISSIONS MONITORING SYSTEM (CEMS 101)

PURPOSE

The purpose of the Continuous Emissions Monitoring System (CEMS) Training Course is to introduce the Student to a variety of concepts and measurement techniques used when working with stationary emissions monitoring systems. This course covers stationary systems used on furnaces, boilers, waste water discharge, cooling towers and flares.

AUDIENCE

The course is designed for analyzer engineers, supervisors, analyzer specialist, environmental or analyzer technicians who are seeking a better understanding of continuous emissions monitoring systems. Individuals attending this course should have attended the Basic Chemistry Training Course prior to taking the CEMS Course.

COURSE OBJECTIVES

1. Overview of Why CEMS are used.
2. Overview of stationary stack furnace or boiler CEMS.
3. Overview of stationary Waste Water CEMS.
4. Overview of stationary Cooling Tower CEMS.
5. Overview of stationary Flare CEMS.
6. Detailed explanation of the function of the hardware used in the various CEMS.
7. Detailed explanation of performance and calibration specifications.
8. CEMS Reporting requirements.
9. Help participants develop a better understanding of how this information is used when working with process analytical instrumentation.

STRUCTURE

Formal training class consist of fifteen (15) sessions, and includes labs, a baseline exam and final exam.

MATERIALS AND TOOLS

Each session includes an introduction, learning objectives, participatory methodologies, and activities. A pre/post course assessment and peer feedback form on practice sessions are included.

TIME

Twenty-four (24) hours of on-line and formal class room technical content.

24 Hours
Pd
Professional Development
3 Days

COST

$1,620

GAS CHROMATOGRAPH TROUBLESHOOTING (GC-102)

PURPOSE

The purpose of the Gas Chromatograph Troubleshooting Training Course is to cover fundamental and advanced concepts of gas chromatograph troubleshooting.

AUDIENCE

The course is designed for analyzer specialists or analyzer technicians who are seeking a better understanding or want to develop additional gas chromatograph troubleshooting skills.
Individuals attending this course must have 5+ years of experience working with gas chromatographs. Recommended classes before taking this course include Basic Chemistry and Basic Chromatography or Practical Skills Gas Chromatograph Training Programs. **This is not an entry level course.**

COURSE OBJECTIVES

1. Basic Chromatography Review.
2. Troubleshooting various hardware components of a gas chromatograph.
3. Baseline correction methods.
4. Explanation and demonstration of peak integration.
5. Explanation and demonstration of converting peak integration into a concentration
6. Help participants develop a better understanding of how this information is used to maintain and troubleshoot the equipment.

STRUCTURE

15 sessions, labs, a baseline exam and final exam.

MATERIALS AND TOOLS

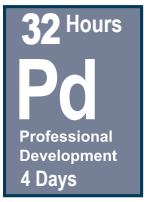
Each session includes an introduction, learning objectives, participatory methodologies, and activities. A pre/post course assessment and peer feedback form on practice sessions are included.

TIME

Thirty-two (32) hours technical content.

COST

$2,625



GAS CHROMATOGRAPH PRACTICAL SKILL (GC-103)

PURPOSE

The purpose of the Gas Chromatograph Troubleshooting Training Course is to cover fundamental and advanced concepts of gas chromatography. This course utilizes a one of a kind gas chromatograph simulator which allows the student to learn and demonstrate understanding in method development, GC gating and calibration. Additionally, the simulator can be set up to run in backflush or heatcut backflush mode to test the student's comprehension of this subject matter.

AUDIENCE

The course is designed for analyzer specialists or analyzer technicians who are seeking a better understanding of how to set-up a gas chromatograph. This program is 20-30% lecture and 70- 80% lab. Individuals attending this course must have one year of experience working with gas chromatographs or have completed the Basic Chemistry and Basic Chromatography Training Course. **This is not an entry level training course.**

COURSE OBJECTIVES

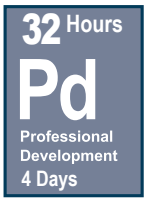
1. Basic Chromatography Review.
2. Explanation and demonstration of peak integration.
3. Baseline correction methods.
4. Explanation and demonstration of converting peak integration into a concentration using standard calculations that are found in ABB, Siemens, Yokogawa and Emerson gas chromatographs.
5. Setting up a method for a gas chromatograph.
6. Setting peak times using the GC simulation software.
7. Setting backflush valve timing using the GC simulation software
8. Setting heartcut-backflush valve timing using the GC simulation software
9. Setting dual heartcut-backflush valve timing using the GC simulation software
10. Help participants develop a better understanding of how this information is used to maintain and troubleshoot the equipment.

STRUCTURE

15 sessions, labs, a baseline exam and final exam.

MATERIALS AND TOOLS

Each session includes an introduction, learning objectives, participatory methodologies, and activities. A pre/post course assessment and peer feedback form on practice sessions are included.



TIME

Thirty-two (32) hours technical content.

COST

$2,625

GAS DETECTION FUNDAMENTALS

PURPOSE

The purpose of the Gas Detection Training Course is to cover fundamental concepts of gas detection and to allow for Stake Holders to self-certify their technicians in the use and calibration of this safety equipment. Both area monitors and analyzer shelter gas detection systems are covered. This class consists of formal lecture and hands-on training.

AUDIENCE

The course is designed for engineers or analyzer technicians who are seeking a better understanding of oxygen deficiency, LEL and toxic gas detection and how to approach specific problems when dealing with this technology.

COURSE OBJECTIVES

1. Introduce participants to fundamentals of oxygen gas measurement.
2. Introduce participants to fundamentals of Lowe Explosive Level gas measurement.
3. Introduce participants to fundamentals of toxic gas measurement.
4. Review gas detection hardware.
5. Review of software and User Parameters.
6. Calibration of Oxygen, LEL and Toxic Gas Analyzer.
7. Troubleshooting the Area Gas Monitor Analyzer.
8. Help participants develop a better understanding of how this information is used to maintain and troubleshoot the equipment.

STRUCTURE

7 sessions, labs, a baseline exam and final exam.

MATERIALS AND TOOLS

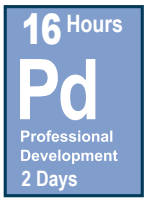
Each session includes an introduction, learning objectives, participatory methodologies, and activities. A pre/post course assessment and peer feedback form on practice sessions are included.

TIME

Sixteen (16) hours technical content.

COST

$1,380



KEY PERFORMANCE INDICATOR (KPI)

PURPOSE

The purpose of the Key Performance Indicator (KPI) Training Course is to introduce or strengthen the importance of performance metrics used in conjunction with process analytical systems.

AUDIENCE

The course is designed for individuals who work with process analyzers. This course is designed for engineers, supervisors, lab and analyzer technicians who are seeking a better understanding of Key Performance Indicators.

COURSE OBJECTIVES

1. Introduce participants to principles and concepts of KPI.
2. Develop participants' capacity to understand concepts of KPI, Statistical Quality Control and Gage Test.
3. Equip participants with knowledge so they understand how performance metrics can be used to improve equipment performance.
4. Identify how these concepts apply to process sample conditioning systems and analyzers.
5. Help participants develop a better understanding of how this information is used in their daily task.

STRUCTURE

15 sessions, 12 Labs, a baseline and final exam.

MATERIALS AND TOOLS

Each session includes an introduction, learning objectives, participatory methodologies, and activities. A pre/post course assessment and peer feedback form on practice sessions are included.

TIME

Twenty-four (24) hours technical content.

COST

Call for Pricing

PROCESS ANALYZER ENGINEERING (PAE-101)

PURPOSE

The purpose of the Process Analyzer Engineering Course is to strengthen the understanding of those individuals who work with or support process analyzers on a daily basis.

AUDIENCE

The course is designed for individuals who work with process chromatographs. This course is designed for engineers or analyzer specialist seeking a better understanding of project methodologies and the project execution cycle. Individuals attending this training course should have previous work experience with process analytical instrumentation or lab analyzers.

COURSE OBJECTIVES

1. Introduce participants to principles and concepts of process analyzer engineering.
2. Explanation of lag time, dew point and bubble point calculations.
3. Cover in detail additional calculations which are typically done during an analyzer project including shelter wind, roof, floor loading, heat loading and HVAC sizing, sample line pressure loss, Reynolds Number, power loading and the development of the power loading schedule, heated sample line and thermo-well fail calculations.
4. Develop participants' capacity to read and understand shelter mechanical and electrical drawings, sample system drawings and other project related drawings.
5. Equip participants with knowledge so they understand datasheets.
6. Explain a typical project cycle.
7. Help participants develop a better understanding of how this information is used during the project engineering cycle.
8. Demonstrate basic understanding of these concepts by completing various lab exercises during the training.

STRUCTURE

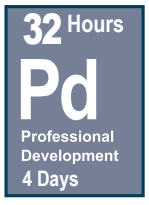
15 sessions, labs plus a baseline and final exam.

MATERIALS AND TOOLS

Each session includes an introduction, learning objectives, participatory methodologies, and activities. A pre/post course assessment and peer feedback form on practice sessions are included.

TIME

Thirty-two (32) hours technical content.



COST

Call for Pricing

PROCESS ANALYZER FUNDAMENTALS (PAF-101)

PURPOSE

The purpose of the Process Analyzer Fundamentals Course is to strengthen the understanding of those individuals who work with or support process analyzers used in the hydrocarbon processing industry (chemical plants or refineries).

AUDIENCE

The course is designed for individuals who work with process analyzers used in the hydrocarbon processing industry. This course is designed for engineers, supervisors, analyzer specialist or analyzer technicians seeking a better understanding of the operating principles of process analyzers.

COURSE OBJECTIVES

1. Introduce participants to principles and concepts of process analyzers.
2. Explanation of in-situ and extractive measurements.
3. Develop participants' capacity to understanding basic measurement techniques including conductivity, pH, gas chromatography, spectroscopy and continuous analyzers.

STRUCTURE

15 sessions plus a baseline and final exam.

MATERIALS AND TOOLS

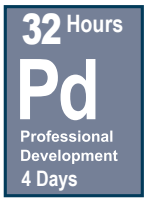
Each session includes an introduction, learning objectives, participatory methodologies, and activities. A pre/post course assessment and peer feedback form on practice sessions are included. Each student will receive a copy of the latest edition of the Process Measurement and Analysis by Bela Liptak.

TIME

Thirty-two (32) hours technical content.

COST

$2,340



SAMPLE SYSTEM MAINTENANCE (PSS-101)

PURPOSE

The purpose of the Sample System Training Course is to introduce the basic concepts and hardware found in process sample conditioning systems and how this hardware is used in conjunction with process analytical systems.

AUDIENCE

The course is designed for individuals who work with process analyzers. This course is designed for engineers, supervisors and analyzer technicians who are seeking a better understanding of sample conditioning systems.

COURSE OBJECTIVES

1. Introduce participants to fundamentals, principles and concepts of sample conditioning.
2. Explain and demonstrate to the students the three major types of sample conditioning systems.
3. Explain and demonstrate to the students the hardware used in the various sample conditioning systems.
4. Equip participants with knowledge so they understand how sample conditioning systems operate and the steps required improve equipment performance.
5. Identify how these concepts apply to process sample conditioning systems.
6. Help participants develop a better understanding of how this information is used to maintain and troubleshoot the equipment.

STRUCTURE

Formal training sessions which also include a baseline and final exam.

MATERIALS AND TOOLS

Each session includes an introduction, learning objectives, participatory methodologies, and activities. A pre/post course assessment and peer feedback form on practice sessions are included.

TIME

Twenty-four (24) hours technical content presented in the formal training session.

COST

$2,100

SAMPLE SYSTEM PRACTICAL SKILL (PSS-102)

PURPOSE

This course is designed to provide hands-on experience with process sample conditioning systems. This training program is 30% lecture and 70% lab. Students will work with actual process sample conditioning hardware and the Smith Analytical Sample System Simulator during this course. Each Student will be required to review a vapor and liquid sample system drawing and then construction the system using the equipment and tools which are provided with this program. Students should attend the Basic Sample System Course PSS-101 or the Advance Sample System Course PSS-102 before attending this course. This is not an entry level training program.

AUDIENCE

The course is designed for analyzer specialist or analyzer technicians who are seeking a better understanding of process analyzer sample systems. This program is 20-30% lecture and 70-80% lab. Individuals attending this course must have one year of experience working with process sample systems or have completed the Basic Chemistry and Process Sample System Training Course. **This is not an entry level training course.**

COURSE OBJECTIVES

1. Sample System Review.
2. Troubleshooting Labs.
3. Vapor Sample System Lab.
4. Liquid Sample System Lab.
5. Liquid Vaporizing Sample System Lab.

STRUCTURE

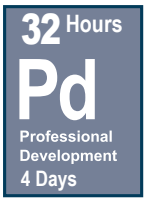
5 sessions, labs, a baseline exam and final exam.

MATERIALS AND TOOLS

Each session includes an introduction, learning objectives, participatory methodologies, and activities. A pre/post course assessment and peer feedback form on practice sessions are included.

TIME

Thirty-two (32) hours technical content.



COST

Call for Pricing

SIEMENS ADVANCE CHROMATOGRAPHY (SA-101)

PURPOSE

The purpose of the Siemens Advance Chromatography Training Course is to strengthen the understanding of those individuals who work with or support process gas chromatograph analyzers on a daily basis. This course is generally attended by individuals who desire a better understanding of this gas chromatograph or want to understand specific troubleshooting techniques. The course is designed to cover in detail all aspects of the Siemens Advance Gas Chromatograph. During this course, the Instructor will cover the hardware and software used in the Advance Gas Chromatograph, calibration of the GC and common troubleshooting techniques.

AUDIENCE

The course is designed for individuals who work with the Siemens process gas chromatographs. This course is designed for engineers, supervisors and analyzer technicians seeking a better understanding of the operational theory of this technology.

COURSE OBJECTIVES

1. Introduce participants to principles and concepts of basic chromatography.
2. Overview of Siemens Advance GC Hardware.
3. Troubleshooting the Siemens Advance GC.
4. Develop participants' capacity to read and understand valve diagrams.
5. Equip participants with knowledge so they understand basic Siemens operational and troubleshooting concepts.
6. Explain the operational theory of peak integration, baseline correction and calibration.
7. Demonstrate basic understanding of these concepts by using the Siemens GC software.
8. (APC).

STRUCTURE

15 sessions, calibration and troubleshooting labs plus a baseline and final exam.

MATERIALS AND TOOLS

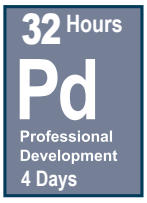
Each session includes an introduction, learning objectives, participatory methodologies, and activities. A pre/post course assessment and peer feedback form on practice sessions are included.

TIME

Thirty-two (32) hours technical content.

COST

$3,150



SIEMENS MAXUM CHROMATOGRAPHY (SM-101)

PURPOSE

The purpose of the Siemens Maxum Chromatography Training Course is to strengthen the understanding of those individuals who work with or support process gas chromatograph analyzers on a daily basis. This course is generally attended by individuals who desire a better understanding of this gas chromatograph or want to understand specific troubleshooting techniques . The course is designed to cover in detail all aspects of the Siemens Maxum Gas Chromatograph. During this course, the Instructor will cover the hardware and software used in the Maxum Gas Chromatograph, calibration of the GC and common troubleshooting techniques.

AUDIENCE

The course is designed for individuals who work with the Siemens process gas chromatographs. This course is designed for engineers, supervisors and analyzer technicians seeking a better understanding of the operational theory of this technology.

COURSE OBJECTIVES

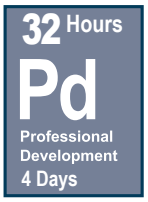
1. Introduce participants to principles and concepts of basic chromatography.
2. Overview of Siemens Maxum GC Hardware.
3. Troubleshooting the Siemens Maxum GC.
4. Develop participants' capacity to read and understand valve diagrams.
5. Equip participants with knowledge so they understand basic Siemens operational and troubleshooting concepts.
6. Explain the operational theory of peak integration, baseline correction and calibration.
7. Demonstrate basic understanding of these concepts by using the Siemens Maxum GC EZ Chrom and Portal Software.

STRUCTURE

15 sessions, calibration and troubleshooting labs plus a baseline and final exam.

MATERIALS AND TOOLS

Each session includes an introduction, learning objectives, participatory methodologies, and activities. A pre/post course assessment and peer feedback form on practice sessions are included.



TIME

Thirty-two (32) hours technical content.

COST

$2,625

THERMO-SCIENTIFIC 42I (NOX) AND 48I (CO) ANALYZER

PURPOSE

The purpose of the Thermo-Sceintific 42//48 Analyzer Training Course is to cover fundamental concepts of carbon monoxide and NOx in gas measurement, provide an overview of the analyzers in addition to calibration and hands-on labs with this equipment.

AUDIENCE

The course is designed for engineers or analyzer technicians who are seeking a better understanding of CEMS or process measurements using the Thermo 421/48i Analyzers and how to approach specific problems when dealing with this technology.

COURSE OBJECTIVES

1. Introduce participants to fundamentals of oxygen in gas measurement.
2. Review Thermo 42i NOx analyzer hardware.
3. Thermo 48i NOx analyzer hardware.
4. Review of User Parameters.
5. Calibration of the 42i NOx Analyzer.
6. Calibration of the 48i CO Analyzer.
7. Troubleshooting the 42i and 48i Analyzers.
8. Help participants develop a better understanding of how this information is used to maintain and troubleshoot the equipment.

STRUCTURE

7 sessions, labs, a baseline exam and final exam.

MATERIALS AND TOOLS

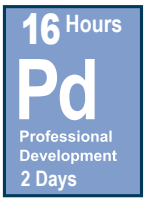
Each session includes an introduction, learning objectives, participatory methodologies, and activities. A pre/post course assessment and peer feedback form on practice sessions are included.

TIME

Sixteen (16) hours technical content.

COST

Call for Pricing



ANALYZER TECHNICIAN LEVEL 1 CERTIFICATION (ATL1C)

Currently no certification organization (ISA, NCCER) offers any type of Analyzer Technician Certification Program. Smith Analytical has developed a comprehensive written and hands-on program, which allows our Clients to "Self-Certify" their Analyzer Technicians.

Students who attend the Analyzer Technician Level 1 Certification Program should have attended formal training programs on the subject matter and have hands-on, field experience. This is NOT a training program, but a Certification Program.

The Analyzer Technician Level 1 Certification Program evaluates the students' understanding of Basic Chemistry, Basic Chromatography, Process Analyzer Fundamentals and Sample System Theory and Maintenance.

The **Level 1** Certification consist of:

1. Fifty (50) question multiple choice test covering Basic Chemistry
2. Fifty (50) question multiple choice test covering Basic Gas Chromatography
3. Fifty (50) question multiple choice test covering Process Analyzer Fundamentals
4. Fifty (50) question multiple choice test covering Sample System Theory and Maintenance

Students must score 80% or better on each of the individual exams to obtain a passing score. A certificate will be issued for each individual exam passed. Those students passing all four individual test will be awarded the **Analyzer Technician Level 1 Certification Certificate**.

COST

Call for Pricing

ANALYZER TECHNICIAN LEVEL 2 CERTIFICATION (ATL2C)

Currently no certification organization (ISA, NCCER) offers any type of Analyzer Technician Certification Program. Smith Analytical has developed a comprehensive written and hands-on program, which allows our Clients to "Self Certify" their Analyzer Technicians.

Students who attend the Analyzer Technician Level 2 Certification Program should have attended formal training programs on the subject matter and have hands-on, field experience. This is NOT a training program, but a Certification Program.

The Analyzer Technician Level 2 Certification Program evaluates the students' understanding of Continuous Emissions Monitoring Systems, Practical Gas Chromatography and Process Analyzer Troubleshooting skills.

The **Level 2** Certification consist of:

1. Fifty (50) question multiple choice test covering Continuous Emissions Monitoring Systems (CEMS)
2. Fifty (50) question multiple choice test covering Practical Gas Chromatography
3. Fifty (50) question multiple choice test covering Process Analyzer Troubleshooting
4. Hands on test setting up a gas chromatograph method including setting up a back-flush and heart cut. Students will use the Smith Analytical GC Simulator to complete this portion of the training

Students must score 80% or better on each of the individual exams to obtain a passing score. A certificate will be issued for each individual exam passed. Those students passing all four individual test will be awarded the **Analyzer Technician Level 2 Certification Certificate**.

COST

Call for Pricing

COURSE OFFERINGS

SAFETY

VECTOR UNIVERSITY

OSHA 10 GENERAL INDUSTRY TRAINING

OSHA recommends this training as an orientation to occupational safety and health.
COST: $1,700 for 3 to 10 students / $170 per person over 10

OSHA 30 GENERAL INDUSTRY TRAINING

General Safety Training Course is a comprehensive safety program designed for anyone involved in general industry.
COST: $4,000 for 3 to 10 students / $400 per person over 10

COMPETENT PERSON SCAFFOLD TRAINING

General Safety Training Course that provides the OSHA standards as they apply to scaffolding.
COST: $1,700 for up to 10 students / $170 per person over 10

COMPETENT PERSON FALL PROTECTING TRAINING

General Safety Training Course encompasses a myriad of circumstances in which a fall may occur.
COST: $950 for up to 10 students / $95 per person over 10

FORKLIFT OPERATOR TRAINING

General Safety Training Course that provides you with the general principles of safe forklift operation and explains the hazards created by using forklifts in the workplace.
COST: $875 for up to 5 students / $175 per person over 5

FIRST AID/CPR/AED

General Safety Training Course that provides students or participants with a basic understanding of First Aid/CPR/AED.
COST: $1,250 for up to 10 students

CERTIFIED RIGGING AND SIGNALMAN TRAINING

Safety Training Course that provides students or participants with a basic understanding of Rigging and Signalman.
COST: $1,700 for up to 10 students

CERTIFIED FLAGGER TRAINING

Safety Training Course that will introduce the duties and responsibilities of a Flagger, as well as related safety concerns.
COST: $950 for up to 10 students / $95 per person over 10

COLLATERAL DUTY SAFETY OFFICER (CDSO) TRAINING

General Safety Training Course that provides students or participants with a basic understanding of the Collateral duty safety officer.
COST: $5,000 for up to 10 students / $500 per person over 10

OSHA 10 CONSTRUCTION TRAINING

This course is intended to provide an entry level construction worker's general awareness on recognizing and preventing hazards on a construction site.
COST: $1,700 for 3 to 10 students / $170 per person over 10

OSHA 30 CONSTRUCTION TRAINING

Construction Safety Training Course that provides you with an overall understanding of OSHA Construction Safety Program.

COST: $4,000 for 3 to 10 students / $400 per person over 10

HEAVY EQUIPMENT OPERATOR TRAINING

Construction Safety Training Course that provides you with an overall understanding of operating heavy equipment.

COST: $850 for up to 5 students / $145 per person over 5

TRAIN THE TRAINER FORKLIFT OPERATOR

Learn how to train your forklift operators for safe operation and meet OSHA requirements.

COST: $1,700 for up to 10 students / $170 per person over 10

TRAIN THE TRAINER HEAVY EQUIPMENT OPERATOR

Learn how to train your heavy equipment operators for safe operation and meet OSHA requirements.

COST: $1,700 for up to 10 students / $170 per person over 10

TRAIN THE TRAINER FOR COMPETENT PERSON TRAINING

Train the Trainer Course that teaches candidate instructors how to develop and deliver a complete in-house training program for Competent Person training.

COST: $1,700 for up to 10 students / $170 per person over 10

PEC TRAINING

Specialized OSHA Training Course that provides general safety information for workers before entering a company facility and while performing their assigned work duties.

COST: PEC Safeland - $1,700 for up to 10 students / $170 per person over 10

PEC Safeland & SafeGulf - $2,000 for up to 10 students / $200 per person over 10

CONFINED SPACE TRAINING

Specialized OSHA Training Course identifies spaces that are considered "confined" because their configurations hinder the activities of employees who must enter, work in, and exit them.

COST: $950 for up to 10 students / $95 per person over 10

FIRE WATCH TRAINING

Specialized OSHA Training Course is designed to identify all possible fire hazards in a workplace.

COST: $950 for up to 10 students / $95 per person over 10

BOTTLE WATCH TRAINING

Specialized OSHA Training Course that provides you with a basic understanding of Bottle Watching.

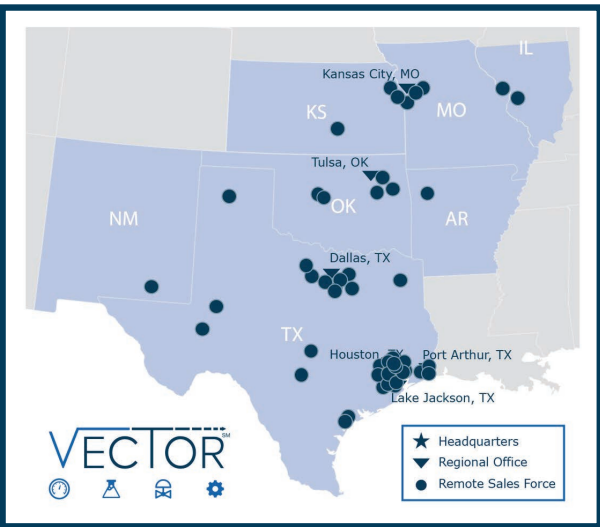
COST: $600 for up to 10 students / $60 per person over 10

NFPA 70E TRAINING (ELECTRICAL TRAINING)

Specialized OSHA Training Course that provides you with a basic understanding of NFPA 70e.

COST: $1,700 for up to 10 students / $170 per person over 10

VECTOR CAG KEY FACTS



- Main facility in the Houston, TX area includes Sales, Business Development, Customer Service, Administrative and Technical Services
- 6 Regional Centers and over 50 Account Managers throughout the territory
- The PTU (Process Training Unit) located in the Houston, TX area, is a fully functional "mini" process plant providing a unique hands on training experience
- As experts in the industry, Vector Technical Services provides the market with more efficient and timely service results

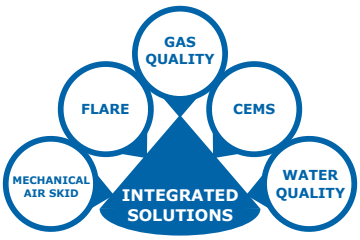
Instrumentation and Automation | **Analytical** | **Mechanical** | **Service**

Instrumentation and Automation
Our portfolio includes multiple measurement solutions for gas and liquid flow and level as well as fire and gas detection.

Analytical Solutions
Vector's broad offering of measurement solutions can help solve simple or complex process requirements. Whether you are needing a single measurement or an engineered multi-parameter solution, Vector can solve your problem.

Mechanical Solutions
We specialize in providing engineered systems for air and gas compression, dryers and filtration.

Service Solutions
Vector's Technical and Process Improvement Service teams can assist in any on-demand, startup and commissioning or reliability improvement problems. We offer off-site and on-site flow calibration and repair services to assist you in your most critical measurements.



Integrated Solutions
We offer integrated solutions that supports the four (4) core businesses. Our solutions include Gas Quality, Flare, CEMS (Continued Emissions Monitoring Systems), Mechanical Air Skid and Water Quality solutions.

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