

# AIChE® Academy Catalog

Your definitive source for chemical engineering training and education.



[www.iche.org/academy](http://www.iche.org/academy)

Biological Engineering

Chemical Engineering Practice

Chemicals & Materials

Energy

Process Safety

Professional Development

Sustainability & Environment

**Welcome** to the latest AIChE® Academy catalog. Inside you'll find more than 65 courses relevant to Chemical Engineers from process safety to capital project planning to bioengineering and more. Six of these courses are new to the AIChE Academy.

AIChE Academy makes it possible to find the finest chemical engineering training in one convenient location. Visit the AIChE Academy website and you'll find even more webinars, conference recordings and videos that can help meet your training needs. The site is fully searchable by format, subject and keyword.

### **AIChE Academy Courses are Created and Taught by Experts.**

Every course offered by the AIChE Academy has been developed by professionals with acknowledged proficiency in the subject matter. All course content has been reviewed by teams of experts drawn from these professional bodies:

- **AIChE**, the American Institute of Chemical Engineers, is the world's leading professional organization for chemical engineers. AIChE members work at companies across the chemical enterprise and teach at leading universities in more than 100 countries.
- **CCPS**®, the Center for Chemical Process Safety, focuses on process safety R&D. The member companies of CCPS work together to develop and implement guidelines and practices that significantly reduce the risk of process safety incidents.
- **SBE**, the Society for Biological Engineering, organizes conferences, operates research consortia and acts to promote emerging technologies that apply chemical engineering knowledge in biological applications.

### **Choose from Online, In-person and Onsite Course Delivery.**

AIChE Academy courses are delivered as online eLearning courses or instructor-led public courses. Many subjects are available in both formats and any course from the AIChE Academy can be delivered onsite at your company. Find out how any AIChE Academy course can be customized to your company's operations. For a consultation, please contact us at [edu@aiiche.org](mailto:edu@aiiche.org)

### **Visit the AIChE Academy for Recorded Conference Presentations, Webinar Bundles and Videos.**

AIChE Academy offers more than just the best training for chemical and biological engineers. It's also your go-to source for technical information including live and archived webinars, conference recordings and videos that illustrate key chemical engineering principles.

I encourage you to visit [www.aiiche.org/academy](http://www.aiiche.org/academy) and see all that the AIChE Academy has to offer.

Sincerely,



Anne A. Schaeffer  
Director, AIChE Academy

P.S. Many professional engineers use courses from the AIChE Academy to satisfy their continuing education requirements. Now many of the courses have been approved by authorities including RCEP, New York State Board for Engineering and Land Surveying, New Jersey Board of Professional Engineers and Land Surveyors and the Florida Board of Professional Engineers. Look for courses with the "Approved" icon.

**ICON KEY** Use these icons to speed your search. Each course is categorized by skill level, delivery mode and other criteria.

#### **Course Levels**

- B Basic** – For those who've just entered the workforce or who are looking for a refresher on a topic.
- I Intermediate** – For those looking to expand their knowledge base on a topic or whose work experience serves as a prerequisite to the course.
- A Advanced** – For the seasoned industry veteran who is looking to gain new insights.

#### **Format**

- E eLearning** – Delivered online through AIChE Academy. Courses are available at your convenience and are self-paced.
- P Public** – Delivered live and in person at venues around the country and sometimes across the globe.
- In-Company** – Every course in the AIChE Academy is available as an In-Company course. Courses can be tailored to your needs and delivered in your facility by an industry expert. For more information, visit [www.aiiche.org/incompany](http://www.aiiche.org/incompany)

#### **Other**

- ★ Bestseller** – Denotes AIChE Academy's top selling courses.
- ✓ Approved** – Approved by one or more of the following: New York State Board for Engineering and Land Surveying, Registered Continuing Education Program (RCEP), New Jersey Board of Professional Engineers and Land Surveyors and Florida Board of Professional Engineers. See course page online for complete information on approving authorities.

**Bios** - Where applicable the course instructor(s) have been noted at the end of each course description. There are bios for each instructor at the back of the catalog on p. 60. For complete instructor bios please refer to [www.aiiche.org/academy](http://www.aiiche.org/academy)

## Biological Engineering

SBE's Biomufacturing for Chemical Engineers . . . . .	5
SBE's Bioseparations: Principles, Applications and Scale-Up. . . . .	5
SBE's Biotechnology for Chemical Engineers . . . . .	6
IMES Metabolic Engineering Webinar Bundle . . . . .	6

## Chemical Engineering Practice

AIChE's Basics of the Chemical Industry . . . . .	7
Cheers! The Chemistry of Wine . . . . .	7
Chemical Engineering Essentials from Academic Authors – Session Seven – Thermodynamics: Basics and Modeling . . . . .	7
AIChE's Chemical Engineering for Non-Chemical Engineers . . . . .	8, 12
AIChE's Control System Techniques in Equipment Design and Operations . . . . .	9
AIChE's Distillation in Practice. . . . .	9-10
AIChE's Distillation Technology for Operators . . . . .	11
AIChE's Essentials of Chemical Engineering for Operators. . . . .	13
Flames & Fires Webinar Bundle . . . . .	13
AIChE's Fluid Mixing Technology for Operators . . . . .	14
Food and Drink Webinar Bundle . . . . .	14
AIChE's Heat Exchanger Design and Operations . . . . .	15
AIChE's Industrial Fluid Mixing for Engineers. . . . .	16
AIChE's Integrated Process Synthesis . . . . .	16
AIChE's Intellectual Property for Chemical Engineers . . . . .	17
Mixing and Fluid Mechanics Webinar Bundle . . . . .	17
Molecular Gastronomy: The Science of Flavor . . . . .	18
Piping & Instrumentation Drawings . . . . .	18
Process Flow Diagrams . . . . .	18
Tapping into the Chemistry of Beer and Brewing . . . . .	18
The Chemistry of Chocolate: Fermentations to Crystallization Kinetics in the Creation of a Cherry Cordial . . . . .	18
AIChE's Principles and Practices of Chemical Reactor Design and Operations . . . . .	18
AIChE's Applied Separations - Evaporation and Adsorption . . . . .	19
AIChE's Statistical Process Quality Control . . . . .	20

## Chemicals & Materials

AIChE Annual Meeting 2012 Recording Bundle – Quality by Design (QbD) in Pharmaceutical Discovery, Development, and Manufacturing . . . . .	21
AIChE Annual Meeting 2011 Recording Bundle – Quality by Design (QbD) in Pharmaceutical Discovery, Development, and Manufacturing . . . . .	21
AIChE Annual Meeting 2010 Recording Bundle – Quality by Design (QbD) in Pharmaceutical Discovery, Development, and Manufacturing . . . . .	21
AIChE Annual Meeting 2014 Recording Bundle – Pharmaceutical Discovery, Development, and Manufacturing (PD2M) . . . . .	21

AIChE Annual Meeting 2013 Recording Bundle – Pharmaceutical Discovery, Development, and Manufacturing (PD2M) . . . . .	21
AIChE Fuels and Petrochemicals 2015 Recording Bundle. . . . .	21
AIChE Fuels and Petrochemicals 2014 Recording Bundle. . . . .	21
AIChE Fuels and Petrochemicals 2013 Recording Bundle. . . . .	21
AIChE's Crystallization Operations . . . . .	21
AIChE's Crystallization Process Development. . . . .	22
AIChE's Flow of Solids in Bins, Hoppers, Chutes and Feeders . . . . .	22, 24
AIChE's Particle and Bulk Solids Characterization Technology . . . . .	23
AIChE's Particle Technology. . . . .	23
AIChE's Pneumatic Conveying of Bulk Solids . . . . .	25-26
Solids Webinar Bundle . . . . .	26

## Energy

AIChE Annual Meeting 2014 Recording Bundle – International Congress on Energy (ICE) . . . . .	27
AIChE Annual Meeting 2013 Recording Bundle – International Congress on Energy (ICE) . . . . .	27
AIChE Annual Meeting 2012 Recording Bundle – International Congress on Energy (ICE) . . . . .	27
AIChE Annual Meeting 2011 Recording Bundle – International Congress on Energy (ICE) . . . . .	27
Energy Markets Webinar Bundle . . . . .	27

## Process Safety

CCPS' 20 Elements of Risk Based Process Safety (RBPS). . . . .	28
CCPS 11th Global Congress on Process Safety 2015 Recording Bundle . . . . .	29
CCPS 10th Global Congress on Process Safety 2014 Recording Bundle . . . . .	29
CCPS 9th Global Congress on Process Safety 2013 Recording Bundle . . . . .	29
CCPS 8th Global Congress on Process Safety 2012 Recording Bundle . . . . .	29
CCPS 7th Global Congress on Process Safety 2011 Recording Bundle . . . . .	29
CCPS 6th Global Congress on Process Safety 2010 Recording Bundle . . . . .	29
Dust Explosions . . . . .	29
AIChE's Combustible Dust Hazards: Flash Fires and Dust Explosions . . . . .	29
CCPS' HAZOP Studies and Other PHA Techniques for Process Safety and Risk Management . . . . .	30
CCPS' Advanced Concepts for Process Hazard Analysis . . . . .	31
DIERS' Basic Emergency Relief System Design . . . . .	32
CCPS' An Introduction to Methods of Process Safety Hazard Assessment . . . . .	32
DIERS' Advanced Emergency Relief Systems Design . . . . .	33

## Process Safety (continued)

CCPS' Hazard Identification for Operations and Maintenance Workers . . . . .	34
CCPS' HAZOP Studies . . . . .	35
CCPS' Incident Investigation . . . . .	36
CCPS' Inherently Safer Design . . . . .	36
Laboratory Safety Webinar Bundle . . . . .	37
CCPS' Layer of Protection Analysis (LOPA) . . . . .	37
CCPS' Managing Process Safety Risks During Organizational Change . . . . .	38
Overpressure Protection Webinar Bundle . . . . .	39
Overview of Risk Based Process Safety . . . . .	39
CCPS' Process Safety Boot Camp . . . . .	40
Process Safety Fundamentals Webinar Bundle . . . . .	43
CCPS' Process Safety Leadership for Front-Line Supervisors . . . . .	43
CCPS' Process Safety Management for Biodiesel . . . . .	44
CCPS' Process Safety Management for Bioethanol . . . . .	44
CCPS' Process Safety Management Overview . . . . .	45
Process Troubleshooting . . . . .	46
CCPS' Recognizing Catastrophic Incident Warning Signs . . . . .	46
SACHe Certificate Program: Safety in the Chemical Process Industries . . . . .	47
SACHe Certificate Program: Runaway Reactions . . . . .	47
SACHe Certificate Program: Risk Assessment . . . . .	47
SACHe Certificate Program: Chemical Reactivity Hazards . . . . .	47
SACHe Certificate Program: Inherently Safer Design . . . . .	47
SACHe Certificate Program: Dust Explosion Control . . . . .	47
SACHe Certificate Program: Process Safety 101 . . . . .	47
SACHe Certificate Program: Process Safety Lessons Taught from Experience . . . . .	47
SACHe Certificate Program: Basics of Laboratory Safety . . . . .	48
SACHe Certificate Program: Nitrogen's Role in Safety . . . . .	48

CCPS' Senior Leaders and Process Safety: The Role and The Opportunity . . . . .	49
CCPS' The OSHA Regulatory Approach to Process Safety Management . . . . .	49

## Professional Development

AIChE's Project Management for Chemical Engineers . . . . .	50
AIChE's Spreadsheet Programming for Chemical Engineers – Excel's VBA . . . . .	50, 55
An Engineer's Guide to Using Humor . . . . .	51
Critically Thinking About Critical Thinking . . . . .	51
AIChE's Economic Evaluation for Chemical Engineers . . . . .	51
AIChE's Conceptual Development and Capital Cost Estimating . . . . .	52
AIChE's Project Evaluation: Operating Cost Estimating and Financial Analysis . . . . .	53
AIChE's Spreadsheet Problem-Solving for Chemical Engineers . . . . .	54, 57
Job-Changing Skills Webinar Bundle . . . . .	56
Negotiating for a New Position . . . . .	56
Six Sigma for Chemical Engineers . . . . .	56
Spreadsheet Techniques and Problem-Solving for Chemical Engineers . . . . .	56
AIChE's Professional Ethics and Excellence for Chemical Engineers . . . . .	56
AIChE's The Three Keys to Managing a Project Successfully . . . . .	57

## Sustainability & Environment

ACSP's Product Stewardship . . . . .	58
Carbon & Climate Webinar Bundle . . . . .	59
Sustainability from a Systems Approach Webinar Bundle . . . . .	59

<b>Instructor Bios . . . . .</b>	<b>60-69</b>
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## SBE's Biomanufacturing for Chemical Engineers



[www.aiche.org/ela103](http://www.aiche.org/ela103)

Course No.: ELA103  
 Course Length: 7 Hours  
 CEUs: 0.7 PDHs: 7.0  
 AIChE and SBE Members – \$895  
 Non-Members – \$1,195



This online course presents the fundamentals of biomanufacturing. It focuses on the unit operations utilized to manufacture biological drug products. After an overview of product types, processes, and current Good Manufacturing Practice, you'll address the maintenance of cell lines and growth of cells in a bioreactor. Topics such as mass transfer, process control, and product expression are emphasized. In the second half of the course, lectures focus on downstream unit operations that harvest cells, remove byproducts or contaminants, and fill the final bulk product. This course was developed in conjunction with the Biomanufacturing Training and Education Center (BTEC) at NC State and SBE.

### You Will Learn:

- How biopharmaceutical production is regulated
- Cryopreservation
- Basics of metabolism and nutrition requirements
- Cell growth for industrial production
- Centrifuge process and performance parameters
- Stages of a process for production of a biopharmaceutical, including objectives of and equipment used for each stage
- cGMP and key requirements
- Common chromatography techniques used in biomanufacturing and the protein property exploited in each
- Techniques used to protect product from microbial contamination during bulk filling

### Who Should Attend:

Any chemical engineer working in a design, operations, or support function within a biopharmaceutical or vaccine company.

## SBE's Bioseparations: Principles, Applications and Scale-Up



[www.aiche.org/ch401](http://www.aiche.org/ch401)

Course No.: CH401  
 Course Length: 2 Days  
 CEUs: 1.5 PDHs: 15  
 Available for In-Company Training; go to [www.aiche.org/incompany](http://www.aiche.org/incompany) for more information



Gain a solid understanding of the principles, applications and scale-up of bioseparation processes and how to apply them to your day-to-day work. In two days, you'll learn the most important unit operations in industrial bioseparation processes and how to avoid mistakes when analyzing and interpreting bioseparation data. You'll find out how to select appropriate bioseparation equipment and techniques for successful scale-up. Plus, you'll cover other relevant topics, from filtration and extraction to chromatography, adsorption and drying.

### You Will Learn:

- The basic science and mechanisms of various types of bioseparations
- Assaying the biological activity and purity of bioproducts: How to identify and select the right laboratory methods
- How to perform engineering analyses of bioseparation processes

### Who Should Attend:

Engineers and scientists who need a better understanding of the bioseparation processes. It will be especially valuable if you're in these industries:

- Pharmaceutical
- Biotechnology
- Food

### Your Instructor:

Dr. Roger Harrison

Please refer to index on p. 60 for all instructor bios.

Register online at [www.aiche.org/academy](http://www.aiche.org/academy) or call 1-800-242-4363 (or 1-203-702-7660 outside the U.S.)

Key to icons: Bestseller Approved Basic Intermediate Advanced eLearning Public In-Company

## SBE's Biotechnology for Chemical Engineers



[www.aiche.org/ela102](http://www.aiche.org/ela102)

Course No.: ELA102

Course Length: 7 Hours

CEUs: 0.7 PDHs: 7.0

AIChE and SBE Members – \$895

Non-Members – \$1,195



Learn the fundamentals of biotechnology with this course designed for chemical engineers working in design, operations, or other support functions.

This online course focuses on the methods used to develop cell lines to produce a variety of biological drug products. It begins by presenting an overview of microorganisms, other cells, and identification techniques commonly used. These concepts are then used to introduce the methods used for cell line development, metabolic engineering, and several “omics” tools. The final session focuses on expression and purification of biological drug products, monitoring cell growth and product expression, and fermentation/cell culture. This course was developed in conjunction with the Biomanufacturing Training and Education Center (BTEC) at NC State and SBE.

### You Will Learn:

- Survey of microorganisms and cells
- Microbial and cell identification by morphology, physiology and genome sequencing
- Overview of biological drug products
- Basic genetic engineering of microorganisms for cell line development
- Metabolic engineering and use of “omics”
- Expression and purification of biological drug products
- Monitoring cell growth and product expression
- Basic concepts of fermentation and cell culture

### Who Should Attend:

Any chemical engineer working in design, operations, or a support function who wants a deeper understanding of the fundamentals of biotechnology processes.

## IMES Metabolic Engineering Webinar Bundle

Hear from the current and future leaders of metabolic engineering as they discuss how the field has progressed and review its most exciting new developments. These presentations are from conferences and webinars organized by the International Metabolic Engineering Society (IMES).

This webinar bundle includes:

- Using Systems Biology for Identification of Novel Metabolic Engineering Targets
- In Silico Design Tools for Engineering Microbial Biocatalysts
- Metabolic Engineering of Bacteria for Production of Oleochemicals
- Genomatica: 15 Year Journey (and counting)

**Pricing:** AIChE Member Credits - 1

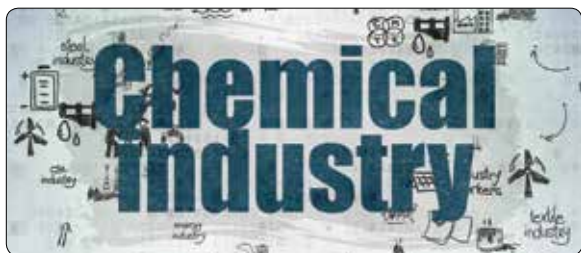
AIChE Members - \$69.00 SBE Members - Free

IMES Members - Free Non-Members - \$99.00

Register online at [www.aiche.org/academy](http://www.aiche.org/academy) or call 1-800-242-4363 (or 1-203-702-7660 outside the U.S.)

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## AICHE's Basics of the Chemical Industry



[www.aiche.org/ela142](http://www.aiche.org/ela142)

Course No.: ELA142  
 Course Length: 4.5 Hours  
 CEUs: 0.45 PDHs: 4.50  
 AIChE Members – \$495  
 Non-Members – \$795



Gain a high-level view of the manufacture and markets for roughly 70 important products and intermediates, including simplified flow diagrams for 22 of them. This online course makes the connections from raw basic materials to components into the consumer market.

Look at characterizing fossil fuels—oil, gas and coal—and their abundance and markets. Discuss biomass as a chemical feedstock, steam crackers, and chemical derivatives from coal and natural gas, such as methanol, acetic acid and others. Examine derivatives from ethylene, propylene, mixed C4 streams, and aromatics and review other important processes such as ammonia and chlor-alkali.

### You Will Learn:

- How fossil fuels and biomass are characterized and their markets as feedstocks for the chemical industry
- The importance and general operation of steam crackers (Olefins plants)
- Fundamental process chemistry and markets for over 80 intermediates and products, from light olefins to complex polymers.
- Process and general market insight for basic processes such as methanol, ammonia, chlor-alkali, and other many other basic processes

### Who Should Attend:

- Process engineers
- Chemists
- Market Managers
- Those new to the chemical industry

### Your Instructor:

Gary Sawyer

## Webinar Archives

### Cheers! The Chemistry of Wine

**Pricing:** AIChE Member Credits - 1  
 AIChE Members - \$69.00  
 Non-Members - \$99.00

<http://www.aiche.org/wine>

### Chemical Engineering Essentials from Academic Authors - Session Seven - Thermodynamics: Basics and Modeling

**Pricing:** AIChE Member Credits - 1  
 AIChE Members - \$69.00  
 Non-Members - \$99.00

<http://www.aiche.org/thermodynamic>

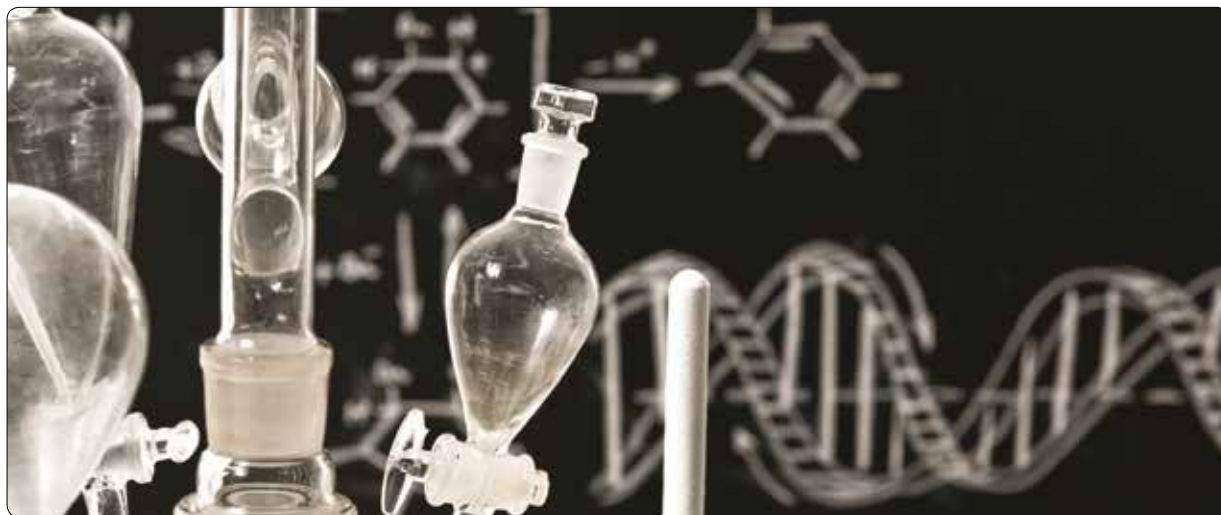
For a complete listing of all webinar archives, go to [www.aiche.org/webinars](http://www.aiche.org/webinars)

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## AIChE's Chemical Engineering for Non-Chemical Engineers



[www.aiche.org/ela110](http://www.aiche.org/ela110)

Course No.: ELA110  
 Course Length: 30 Hours  
 CEUs: 3.0 PDHs: 30  
 AIChE Members – \$895  
 Non-Members – \$1,195



This online course is designed for technicians in the chemical industry and non-chemical engineers who work with or supervise chemical engineers, as well as legal and other professionals who must interact with or manage chemical engineering work.

Participants will learn the basic concepts of chemical engineering, including safety and reactive chemicals, stoichiometry, kinetics, mass and energy balances, pumps and fluid flow, distillation and other mass transfer operations such as absorption, stripping and chromatography, drying, filtration, crystallization, solids handling, process control, tanks and vessel basics, and cooling towers. Industrial examples are used throughout the course to demonstrate how the fundamentals of chemical engineering are applied in the real world.

### You Will Learn:

- The chemical engineering profession and what it entails
- Safety and reactive chemical concepts, reaction stoichiometry
- Chemical stoichiometry and unit conversions
- Mass and energy balances
- Fluid flow and pumping equipment
- Heat transfer and heat exchangers, cooling towers

- Mass transfer concepts, distillation, absorption, stripping/desorption, chromatography, ion exchange, and extraction
- Evaporation, crystallization, filtration, and drying
- Solids handling, characterization, transfer, and storage
- Process control
- Polymers and plastics
- Tanks and process vessels

### Who Should Attend:

Engineering managers without a chemical engineering background, chemists, non-chemical engineers, patent attorneys, legal and government personnel who interface with chemical engineers and the chemical industry. Participants from any size of company or industry in the chemical, petrochemical, and materials processing industries.

### Your Instructor:

Jack Hipple

Please refer to index on p. 60 for all instructor bios.

Register online at [www.aiche.org/academy](http://www.aiche.org/academy) or call 1-800-242-4363 (or 1-203-702-7660 outside the U.S.)

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## AICHE's Control System Techniques in Equipment Design and Operations



[www.aiche.org/ch762](http://www.aiche.org/ch762)

Course No.: CH762

Course Length: 2 Days

CEUs: 1.5 PDHs: 15

Available for In-Company Training; go to [www.aiche.org/incompany](http://www.aiche.org/incompany) for more information



A high level of automation and sophistication is required to control process parameters and detect equipment faults in today's petrochemical plants. Join control system expert A. S. Rangwala and learn automatic control theory methods that enhance efficiency and provide operational safety by ensuring that process parameters do not exceed design capability. Bring a laptop to this course, in which you'll try out the concepts and tools you learn so you can apply them in your own environment.

### You Will Learn:

- Mechanical, thermal, electrical, electronic, pneumatic and fluid control elements
- Feedback mechanisms
- How to identify forced excitation sources
- Valves for overpressure relief
- Flow regulation and proportional control
- Self-tuning and compensation in controller design
- How to alleviate vibration instability

### Who Should Attend:

Professionals in:

- Chemical design and development engineering
- Process control
- Purchasing, sales, manufacture, field repair and inspection of chemical process equipment

### Your Instructor:

A. S. Rangwala

## AICHE's Distillation in Practice



[www.aiche.org/ela112](http://www.aiche.org/ela112)

Course No.: ELA112

Course Length: 20 Hours

CEUs: 2.0 PDHs: 20

AICHE Members – \$795

Non-Members – \$1,095



This online course covers essential distillation concepts likely to be faced by process support, operations, and process design engineering personnel. Along with a review of vapor-liquid equilibrium, this course covers process design, column operation and simulation issues. In addition, you will also learn about specification and selection of the appropriate distillation hardware.

### You Will Learn:

- Fundamentals: vapor-liquid equilibrium, stages and transfer units
- Practice: general column design, tray column design, packed column design, other devices, and methods for predicting efficiency
- Other topics: scale-up, start-up & troubleshooting, and enhanced distillation

### Who Should Attend:

Engineers or other professionals who must troubleshoot and solve difficult distillation problems in the plant or conceptualize difficult distillation problems in the engineering office or laboratory.

### Your Instructor:

John Farone

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Register online at [www.aiche.org/academy](http://www.aiche.org/academy) or call 1-800-242-4363 (or 1-203-702-7660 outside the U.S.)

Key to icons: Bestseller Approved Basic Intermediate Advanced eLearning Public In-Company

## AIChE's Distillation in Practice



[www.aiche.org/ch004](http://www.aiche.org/ch004)

Course No.: CH004  
 Course Length: 3 Days  
 CEUs: 2.3 PDHs: 23  
 AIChE Members – \$1,795  
 Non-Members – \$2,095



While the basic principles underlying distillation remain unchanged, new hardware, problem-solving and troubleshooting strategies, and modeling techniques continue to be developed.

Join distillation expert John P. Farone, get up to date on essential distillation concepts and developments, and learn how to apply them to improve process support, operations and design.

In three days, you'll address essential distillation concepts you're likely to face in process support, operations and design engineering. You'll discover how to specify and select the most appropriate distillation hardware. Plus, you'll learn methods for predicting efficiency using some of today's modeling techniques.

### You Will Learn:

- Thermodynamics, vapor-liquid equilibrium, and basic chemical engineering principles
- Techniques for solving simulation issues, process design considerations and column operations
- Guidelines for specifying and purchasing the right hardware
- Problem-solving and troubleshooting distillation problems in the real world

*"The course dealt well with practical aspects of distillation. Instructor was very knowledgeable and promoted a great atmosphere."*

- Predicting efficiency using the latest modeling techniques

### Who Should Attend:

New and veteran engineers and others who must troubleshoot and solve difficult distillation problems in the plant or conceptualize problems in the engineering office or laboratory – including those in the areas of:

- Process support
- Operations
- Design engineering

### Your Instructor:

John Farone

Register online at [www.aiche.org/academy](http://www.aiche.org/academy) or call 1-800-242-4363 (or 1-203-702-7660 outside the U.S.)

Key to icons: Bestseller Approved Basic Intermediate Advanced eLearning Public In-Company

## AICHE's Distillation Technology for Operators



[www.aiche.org/ela113](http://www.aiche.org/ela113)

Course No.: ELA113

Course Length: 10 Hours

CEUs: 1.0 PDHs: 10

AICHE Members – \$129

Non-Members – \$159



Gain an understanding of the theory underlying successful distillation processes – and, beyond theory, learn what actually happens in a column.

This online course covers a wide range of topics – from basic column design to installation, start-up, shutdown and more. Your instructor, a distillation technology expert, will detail the critical aspects of operating principles common to most distillation operations, regardless of the distillates being produced.

### You Will Learn:

- The fundamentals of distillation and the distillation process
- How to leverage distillation technology basics in your overall system design and in tray and packed-column design
- Advanced knowledge of installation, start-up and shutdown, troubleshooting and distillation column control
- A solid foundation in the principles of operations that apply across all products

### Who Should Attend:

- Engineers or chemists who troubleshoot difficult distillation problems in plant or who conceptualize difficult distillation problems in the engineering office or laboratory
- Distillation veterans
- Distillation newcomers with a few years of experience

### Your Instructor:

John Farone

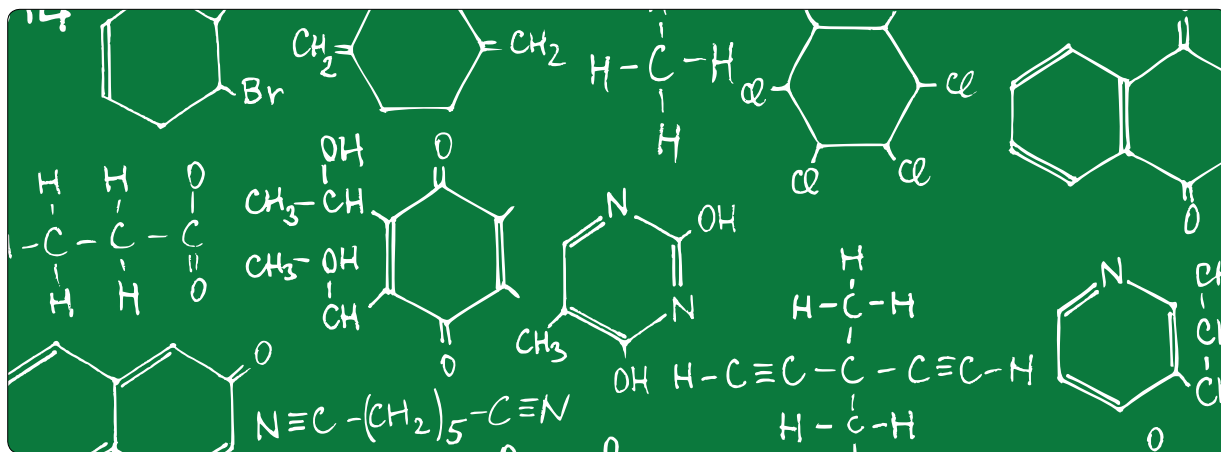


Please refer to index on p. 60 for all instructor bios.

Register online at [www.aiche.org/academy](http://www.aiche.org/academy) or call 1-800-242-4363 (or 1-203-702-7660 outside the U.S.)

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## AIChE's Essentials of Chemical Engineering for Non-Chemical Engineers


[www.aiche.org/ch710](http://www.aiche.org/ch710)

Course No.: CH710  
 Course Length: 3 Days  
 CEUs: 2.3 PDHs: 23  
 AIChE Members – \$1,795  
 Non-Members – \$2,095



In today's workplace, non-engineers are increasingly expected to work with chemical engineers on projects, scale-ups and process evaluations. But to do so, you need a solid understanding of basic concepts of chemical engineering analysis, design and calculations. Join chemical engineering expert Jack Hipple and gain knowledge of the fundamentals of chemical engineering you need to understand, communicate with and work with chemical engineers.

In three days, you'll learn how to hold your own in discussions on safety, industrial hygiene, and reactive chemicals. You'll gain an understanding of the basics of fluid flow, heat transfer, heat exchanger design, and cooling towers, and how to apply them. You'll also learn the basics of solids handling, tank and vessel design, polymerization and polymer processing, and how use this knowledge to sharpen projects and evaluations. Through case studies, you'll see the concepts you learn in action so you can apply them in your workplace when collaborating with chemical engineers on projects, chemistry scale-ups, process evaluations and other initiatives.

#### You Will Learn:

- The role of chemical engineering and chemistry scale-up
- The basics of stoichiometry
- Commonly used chemical engineering calculations
- The basics of safety, industrial hygiene and reactive chemicals
- What you need to know about fluid flow, heat transfer, heat exchanger design and cooling towers

*"Mr. Hipple is very knowledgeable and does an excellent job presenting the course. The course was a positive experience."*

*"Excellent overview, helpful to fill in gaps."*

- Separation technologies – including distillation, absorption, stripping, adsorption, ion exchange and membranes
- What every non-engineer needs to understand about evaporation, crystallization, liquid-solid separations and drying
- Solids handling – the basics
- The basics of tank and vessel design
- Essentials of polymerization and polymer processing
- A working knowledge of process control

#### Who Should Attend:

Non-engineers and engineers without formal chemical engineering training who have up to three years of experience working in a plant with chemical engineers. It will be especially valuable to:

- Operating technicians
- Engineering managers who are not chemical engineers
- Chemists
- DHS, EPA and other government employees
- Other engineers

#### Your Instructor:

Jack Hipple

Register online at [www.aiche.org/academy](http://www.aiche.org/academy) or call 1-800-242-4363 (or 1-203-702-7660 outside the U.S.)

Key to icons: ★ Bestseller   ✓ Approved   B Basic   I Intermediate   A Advanced   E eLearning   P Public   𠂆 In-Company



## AICHE's Essentials of Chemical Engineering for Operators



[www.aiche.org/ela117](http://www.aiche.org/ela117)

Course No.: ELA117

Course Length: 15 Hours

CEUs: 1.5 PDHs: 15

AICHE Members – \$129

Non-Members – \$159



A dynamic online course on the fundamentals of chemical engineering for those who are not chemical engineers, but who work with them. This course offers a comprehensive overview of the function, principles, requirements, and operation of process equipment. Throughout the course, professionals will learn key concepts and will develop a deeper understanding of how chemical engineering relates to their disciplines.

### You Will Learn:

- How to participate in discussions about conservation principles, chemical reactions thermodynamics, and equilibrium
- The basics of fluid flow and mixing, heat exchangers, chemical reactors and process control
- How to confidently handle complex concepts, including distillation and mass transfer operations
- To broaden your view of chemical engineering and how it relates to your discipline

### Who Should Attend:

- Chemists
- Civil and mechanical engineers
- Electrical and industrial engineers
- Construction engineers
- Technical project managers
- Scientists

Please refer to index on p. 60 for all instructor bios.

## Webinar Bundle

### Flames & Fires Webinar Bundle

Learn how fires burn and what fuels a fire, as well as the principle of flammability of vapor-air mixtures. Review a basic introduction to flammable materials and how to prevent fires and explosions.

This webinar bundle includes:

- Fundamentals of Fire and Fire Control
- Flame Flashbacks: Causes and Prevention
- Explosion Protection with In-Line Flame Arresters
- Introduction to Flammable Materials

**Pricing:** AICHE Member Credits - 3  
 AICHE Members - \$207.00  
 Non-Members - \$297.00

**Not a member of AICHE? For more information about joining AICHE, go to [www.aiche.org](http://www.aiche.org) and click Join.**

Register online at [www.aiche.org/academy](http://www.aiche.org/academy) or call 1-800-242-4363 (or 1-203-702-7660 outside the U.S.)

Key to icons: Bestseller Approved Basic Intermediate Advanced eLearning Public In-Company

## AIChE's Fluid Mixing Technology for Operators



[www.aiche.org/ela116](http://www.aiche.org/ela116)

Course No.: ELA116  
 Course Length: 8 Hours  
 CEUs: 0.8 PDHs: 8.0  
 AIChE Members – \$129  
 Non-Members – \$159



Starting with the fundamentals (the basic principles of mixing), this online course continues with practical applications to mixing technology and ends with advanced topics such as solid-liquid processes. Operators will gain an excellent understanding of mixing theories and how they work in today's mixing technology, without getting too product specific.

### You Will Learn:

- Mixing theories and how they are applied in the real world
- Advances in mixing technology
- Fundamentals of mixing technology, including physical properties and hydrodynamics
- Practice: mixing equipment, blending, heat transfer and troubleshooting
- An in-depth look at solid-liquid processes and gas-liquid dispersion

### Who Should Attend:

- Beginning operators
- Experienced operators
- Technicians or non-engineers who can use a better understanding of mixing theories to improve their performance and results

### Your Instructor:

W. Roy Penney, Ph.D.

Please refer to index on p. 60 for all instructor bios.

## Webinar Bundle

### Food and Drink Webinar Bundle

View this special grouping of past AIChE webinars and make your menu plans without a worry.

This webinar bundle includes:

- Molecular Gastronomy: The Science of Flavor
- The Chemistry of Chocolate
- Cheers! The Chemistry of Wine
- Tapping into the Chemistry of Beer and Brewing

**Pricing:** AIChE Member Credits - 3  
 AIChE Members - \$207.00  
 Non-Members - \$297.00

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Register online at [www.aiche.org/academy](http://www.aiche.org/academy) or call 1-800-242-4363 (or 1-203-702-7660 outside the U.S.)

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## AICHE's Heat Exchanger Design and Operations



[www.aiche.org/ch294](http://www.aiche.org/ch294)

Course No.: CH294

Course Length: 2 Days

CEUs: 1.5 PDHs: 15

AICHE Members – \$1,395

Non-Members – \$1,695



Heat exchangers are critical to a wide variety of engineering applications – from power plants to chemical processing facilities. When they go down, you feel the negative impact. Join heat exchanger expert Joseph Holmes or Greg Starks and get up to date on the latest developments and strategies in heat exchanger design and the diagnosis, correction and troubleshooting of costly operating problems.

In two days, you'll examine in detail the design of shell-and-tube exchanger technology – the most common type of heat exchanger in oil refineries and chemical processes – and how to minimize fouling and ensure trouble-free operation. You'll learn how to efficiently operate other types of exchangers, including gasketed plate, spiral plate and air-cooled equipment.

### You Will Learn:

- The critical aspects of heat exchanger design
- The thermal design of shell-and-tube heaters, coolers, column reboilers and condensers
- How to quickly and accurately troubleshoot, diagnose and correct operating problems

### Who Should Attend:

New and experienced chemical and mechanical engineers involved in plant operations, technical services, or project design; or those who handle projects and assignments related to heat exchanger sizing, specification, and operation.

### Your Instructor:

Joseph W. Holmes or S. Greg Starks



**Got a group to train? Bring AIChE Academy to you! See full details on page 44.**

Register online at [www.aiche.org/academy](http://www.aiche.org/academy) or call 1-800-242-4363 (or 1-203-702-7660 outside the U.S.)

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## AIChE's Industrial Fluid Mixing for Engineers



[www.aiche.org/ela115](http://www.aiche.org/ela115)

Course No.: ELA115  
 Course Length: 9 Hours  
 CEUs: 0.9 PDHs: 9.0  
 AIChE Members – \$595  
 Non-Members – \$895



This online course covers fundamentals in mixing theory, including a section on scale-up, practical applications to mixing technology and advanced topics such as solid-liquid process. Engineers gain an excellent understanding of the fundamentals of mixing and how to apply the right technology to the mixing process.

This is a chance to broaden your perspective, whether you're a director of engineering and/or research, process engineer doing research, mechanical equipment specialist, technician, development/design engineer, chemist or vendor engineer.

### You Will Learn:

- The fundamentals of mixing
- A comparison of the performance characteristics of fluid foil impellers vs. traditionally designed models
- How to apply Laser Doppler Velocimetry (LDV) data and Computational Fluid Dynamics (CFD)
- How to analyze a variety of geometric variables, including: tank shape, impeller spacing and baffles
- How to scale up and scale down by using practical, proven techniques of meeting geometrical similarity

### Who Should Attend:

- Process or mechanical engineers involved in the design and/or selection of mixers
- R&D engineers who use mixers which must be scaled to commercial equipment

### Your Instructor:

W. Roy Penney, Ph.D.

## AIChE's Integrated Process Synthesis



[www.aiche.org/ch756](http://www.aiche.org/ch756)

Course No.: CH756  
 Course Length: 3 Days  
 CEUs: 2.3 PDHs: 23  
 Available for In-Company Training; go to [www.aiche.org/incompany](http://www.aiche.org/incompany) for more information



Join process synthesis and integration experts Diane Hildebrandt and Bilal Patel and learn novel design and analysis techniques you can implement early on to avoid costly revisions to processes while reducing material and energy consumption and carbon dioxide emissions.

In three days, you'll discover tools that allow you to gain insight into a process by emphasizing the unity of the process. You'll learn how to apply mass, energy and entropy balances in an entirely new way for the synthesis of flowsheets. You'll examine how to analyze equipment – such as reactors and distillation columns – using mass, energy and entropy balances to identify, measure, and reduce inefficiencies.

### You Will Learn:

- Integrated process synthesis – an overview
- Mass balance
- Energy balance
- Defining the work of separation
- Developing flowsheets

### Who Should Attend:

Professionals working with production processes in the chemical industries – including:

- Design engineers
- Developers of new processes
- Process chemical engineers
- Chemical engineers who work with laboratory teams

### Your Instructors:

Diane Hildebrandt and Bilal Patel

Register online at [www.aiche.org/academy](http://www.aiche.org/academy) or call 1-800-242-4363 (or 1-203-702-7660 outside the U.S.)

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## AIChE's Intellectual Property for Chemical Engineers



[www.aiche.org/els107](http://www.aiche.org/els107)

Course No.: ELS107

Course Length: 10 Hours

CEUs: 1.0 PDHs: 10

AIChE Members – \$795

Non-Members – \$1,095



Protecting intellectual property is increasingly important to engineers and the firms they work with. Yet many engineers do not understand the complexities of the America Invents Act (AIA) or what patent legislation means in practice.

In this online course, you'll get the most current information regarding the new U.S. Patent laws and how to work with them to protect the technologies, processes or products you are developing.

By enrolling in this course you will be exposed to numerous basic patent laws and corresponding strategy including; AIA practices and regulations, intellectual property laws and principles such as patents, trade secrets, copyrights and trademarks.

### You Will Learn:

- The first-to-file system
- Providing types of prior art to invalidate patents
- Providing many ways to challenge patents, both pre and post-grant; and
- Providing defenses to patent infringement, among others

### Who Should Attend:

Engineers involved in R&D and/or IP development/management may find this course particularly useful.

### Your Instructor:

Heath Briggs

Please refer to index on p. 60 for all instructor bios.

## Webinar Bundle

### Mixing and Fluid Mechanics Webinar Bundle

Learn about topics such as Fluid Mixing, Fluidized Bed Technology, Mixing Scale-Up and the problems that can arise. Key steps in addressing the needs for mixing in process development, scale-up and design will be discussed.

This webinar bundle includes:

- Identifying Mixing Problems
- Fluid Mixing: Still Needed for the Process Industries in the 21st Century
- Chemical Engineering Essentials from Academic Authors - Session Four: Fluid Mechanics for Chemical Engineers - Old and New
- Pay Attention to Mixing for Successful Process Development and Scale-Up
- Mixing Scale-Up: Small Mistakes Can Mean Big Success
- Mixing for Success in Batch Systems

**Pricing:** AIChE Member Credits - 5  
AIChE Members - \$345.00  
Non-Members - \$495.00

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Register online at [www.aiche.org/academy](http://www.aiche.org/academy) or call 1-800-242-4363 (or 1-203-702-7660 outside the U.S.)

Key to icons: Bestseller Approved Basic Intermediate Advanced eLearning Public In-Company

## Webinar Archives

### Molecular Gastronomy: The Science of Flavor

**Pricing:** AIChE Member Credits - 1  
AIChE Members - \$69.00  
Non-Members - \$99.00

<http://www.aiche.org/flavor>

### Piping & Instrumentation Drawings

**Pricing:** AIChE Member Credits - 1  
AIChE Members - \$69.00  
Non-Members - \$99.00

<http://www.aiche.org/piping>

### Process Flow Diagrams

**Pricing:** AIChE Member Credits - 1  
AIChE Members - \$69.00  
Non-Members - \$99.00

<http://www.aiche.org/flow>

### Tapping into the Chemistry of Beer and Brewing

**Pricing:** AIChE Member Credits - 1  
AIChE Members - \$69.00  
Non-Members - \$99.00

<http://www.aiche.org/beer>

### The Chemistry of Chocolate: Fermentations to Crystallization Kinetics in the Creation of a Cherry Cordial

**Pricing:** AIChE Member Credits - 1  
AIChE Members - \$69.00  
Non-Members - \$99.00

<http://www.aiche.org/chocolate>

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## AIChE's Principles and Practices of Chemical Reactor Design and Operations



[www.aiche.org/ch522](http://www.aiche.org/ch522)

Course No.: CH522

Course Length: 3 Days

CEUs: 2.3 PDHs: 23

Available for In-Company Training; go to [www.aiche.org/incompany](http://www.aiche.org/incompany) for more information



Improve your ability to design unconventional reactor configurations – even when equations for them are not available – by adopting a new outlook and approach. Join chemical reactor technology expert Uzi Mann and gain knowledge and tools you can apply to the design of any reactor configuration, with any number of reactions, with any stoichiometry, and with any form of rate expression.

This intensive three-day course will broaden your capabilities and prepare you to address and troubleshoot the complex technical challenges you face today.

### You Will Learn:

- How to describe reactor operations in terms of dimensionless variables that vary between -1 and 1
- Designing semi-batch reactors, reactors with distributed feed and distillation reactors
- Dimensionless operating curves
- Economic-based optimization and process control
- Determining profit-based vs. yield-based design and operating conditions

### Who Should Attend:

Chemical engineers and other professionals who are involved in the design, operation and optimization of processes with chemical reactors.

### Your Instructor:

Uzi Mann

**Please refer to index on p. 60 for all instructor bios.**

Register online at [www.aiche.org/academy](http://www.aiche.org/academy) or call 1-800-242-4363 (or 1-203-702-7660 outside the U.S.)

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[www.aiche.org/ela129](http://www.aiche.org/ela129)

Course No.: ELA129

Course Length: 8 Hours

CEUs: 0.8 PDHs: 8.0

AIChE Members – \$595

Non-Members – \$895



Gain a practical, real-world understanding of evaporation and adsorption, two vital applied separation processes. Instructor Alan Gabelman draws on many years of hands-on separations experience in this practical eLearning course.

In the evaporation module, explore how heat transfer occurs in evaporators, evaporator mass and energy balances, sizing calculations, and different types of evaporation equipment. Identify energy-saving strategies such as multiple effect evaporation and vapor recompression. And, compare types of evaporators—the advantages, disadvantages and suitable applications of each.

In the adsorption module, examine adsorption equilibrium, fixed bed operation and the mass transfer zone concept. Delve into calculation of breakthrough capacity and efficiency of adsorbent usage, absorber design and scale-up considerations. This course also covers activated carbon, the most widely used adsorbent, including types of carbon, design of carbon-handling equipment, regeneration options and factors affecting performance.

### You Will Learn:

- How to size an evaporator
- How to choose the right type of evaporator
- To use equilibrium models to assess the suitability of an adsorbent for an application
- To apply the mass transfer zone concept to fixed bed column operation

- How to size and design adsorption columns
- How to select the best adsorbent for a given adsorption challenge
- How to choose the best type of activated carbon
- To adjust process conditions to maximize performance of activated carbon
- To predict ion exchange resin performance using equilibrium calculations
- To use zeolite molecular sieves to separate molecules that are only slightly different in size or polarity

### Who Should Attend:

- Chemical engineers
- Mechanical engineers
- Chemical process scientists
- Chemical technologists
- Technical managers
- Applied separations veterans and recent graduates
- Those in the bulk and specialty chemical, petroleum, food, flavors and other industries

### Your Instructor:

Alan Gabelman

Register online at [www.aiche.org/academy](http://www.aiche.org/academy) or call 1-800-242-4363 (or 1-203-702-7660 outside the U.S.)

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## AICHE's Statistical Process Quality Control



[www.aiche.org/ela128](http://www.aiche.org/ela128)

Course No.: ELA128

Course Length: 8 Hours

CEUs: 0.8 PDHs: 8.0

AICHE Members – \$595

Non-Members – \$895



Learn how to monitor process operation variables using statistical process control charts. AIChE Academy offers a new eLearning course designed for chemical engineers and other professionals who monitor the quality of a process and determine if a process is statistically in or out of control. No background in statistics is required.

Discover a technique based on a statistical analysis of the data that is not limited to just quality but can be used with other numerical measurements. Explore basic statistical analyses and the construction of control charts based on the appropriate error distribution of a process. Learn how to control and interpret those charts. Delve into how to validate data through the Analysis of Variance (ANOVA) and on statistically designed experiments.

### You Will Learn:

- Key concepts in statistical analysis
- Basic statistics
- Run charts and process capability, construction and interpretation
- Gaussian control charts
- Specialty Gaussian control charts

- Binomial attribute control charts
- Sampling and analysis of variance (ANOVA)
- The real world, i.e., when things go bump in the middle of the night

### Who Should Attend:

This course is designed for all professionals, including chemical engineers, involved in monitoring the quality or any other numerical metric of a process and determining if a process is statistically in or out of control. No background in statistics is required.

### Your Instructor:

Dr. T. David Griffith

**Please refer to index on p. 60 for all instructor bios.**

Register online at [www.aiche.org/academy](http://www.aiche.org/academy) or call 1-800-242-4363 (or 1-203-702-7660 outside the U.S.)

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## Conference Presentations

### AICHE Annual Meeting 2012 Recording Bundle – Quality by Design (QbD) in Pharmaceutical Discovery, Development, and Manufacturing

Get all 33 recordings for one low price.

**Pricing:** AIChE Member Credits - 3  
AIChE Members - \$249.00 Non-Members - \$349.00

### AICHE Annual Meeting 2011 Recording Bundle – Quality by Design (QbD) in Pharmaceutical Discovery, Development, and Manufacturing

Get all 45 recordings for one low price.

**Pricing:** AIChE Member Credits - 3  
AIChE Members - \$249.00 Non-Members - \$349.00

### AICHE Annual Meeting 2010 Recording Bundle – Quality by Design (QbD) in Pharmaceutical Discovery, Development, and Manufacturing

Get all 40 recordings for one low price.

**Pricing:** AIChE Member Credits - 3  
AIChE Members - \$249.00 Non-Members - \$349.00

### AICHE Annual Meeting 2014 Recording Bundle – Pharmaceutical Discovery, Development, and Manufacturing (PD2M)

This bundle comprises 32 select papers delivered at the Pharmaceutical Discovery, Development and Manufacturing Forum program during the 2014 AIChE Annual Meeting.

**Pricing:** AIChE Member Credits - 3  
AIChE Members - \$249.00 Non-Members - \$349.00

### AICHE Annual Meeting 2013 Recording Bundle – Pharmaceutical Discovery, Development, and Manufacturing (PD2M)

This bundle comprises 41 select papers delivered at the Pharmaceutical Discovery, Development and Manufacturing Forum program during the 2013 AIChE Annual Meeting.

**Pricing:** AIChE Member Credits - 3  
AIChE Members - \$249.00 Non-Members - \$349.00

### AICHE Fuels and Petrochemicals 2015 Recording Bundle

This bundle comprises 102 select papers delivered at the 2015 AIChE Spring Meeting, all relate to the production, refining, utilization, and conversion of liquid, solid, and gaseous fuels; and in the manufacturing and sales of petrochemicals derived from these fuels.

**Pricing:** AIChE Member Credits - 3  
AIChE Members - \$249.00 Non-Members - \$349.00

### AICHE Fuels and Petrochemicals 2014 Recording Bundle

This bundle comprises 85 select papers delivered at the 2014 AIChE Spring Meeting

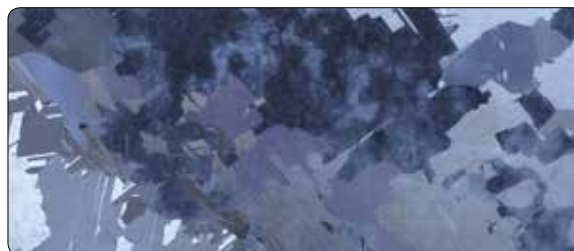
**Pricing:** AIChE Member Credits - 3  
AIChE Members - \$249.00 Non-Members - \$349.00

### AICHE Fuels and Petrochemicals 2013 Recording Bundle

This bundle comprises 103 select papers delivered at the 2013 AIChE Spring Meeting.

**Pricing:** AIChE Member Credits - 3  
AIChE Members - \$249.00 Non-Members - \$349.00

## AIChE's Crystallization Operations



[www.aiche.org/ch110](http://www.aiche.org/ch110)

Course No.: CH110  
Course Length: 2 Days  
CEUs: 1.5 PDHs: 15  
AIChE Members – \$1,395  
Non-Members – \$1,695



Crystallization can be a powerful separation tool in a broad range of industries. But to optimize it, you must clearly understand the process. Join crystallization expert Wayne Genck for a practical overview of the basics of crystallization and precipitation and how to apply the fundamentals of crystal growth and nucleation to industrial processes.

In two days, you'll learn about the theory of material, energy and population balances and how to apply it in the production of amorphous and crystalline materials. You'll also explore how to develop methods for scaling up crystallizers and precipitators.

### You Will Learn:

- To understand polymorphs and cocrystals
- Crystal size distribution
- Crystal purity and the effects of additives
- Batch and industrial crystallizers
- The mixed-suspension, mixed-product removal crystallizer

### Who Should Attend:

Scientists and engineers who are required to understand, optimize and control crystallization processes, especially those who are:

- Engaged in the process development, engineering or operation of organic or inorganic crystallization processes
- Responsible for solving challenges associated with separations involving crystallization

### Your Instructor:

Dr. Wayne Genck

Register online at [www.aiche.org/academy](http://www.aiche.org/academy) or call 1-800-242-4363 (or 1-203-702-7660 outside the U.S.)

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## AICHE's Crystallization Process Development



[www.aiche.org/ela101](http://www.aiche.org/ela101)

Course No.: ELA101  
 Course Length: 8 Hours  
 CEUs: 0.8 PDHs: 8.0  
 AIChE Members – \$595  
 Non-Members – \$895



This online course provides an in-depth overview of an integrative approach for crystallization development – using models to analyze the SLE behavior of the system, validating the model using relevant experimental data, and systematically synthesizing a crystallization process based on the SLE behavior. Starting with fundamental issues such as solubility and physical properties, we will discuss the relevant theories, methods, experimental techniques, and design methods that have been used in many industrial applications for developing an optimum crystallization process. Various examples will be provided throughout the course.

### You Will Learn:

Participants will learn about the solid-liquid equilibrium (SLE) phase diagram and its usage in synthesizing crystallization processes, systematic methods for generating and evaluating crystallization process alternatives using SLE phase diagrams, and calculation and experimental methods for generating SLE phase diagrams.

### Who Should Attend:

- Chemists and engineers engaged in the development of processes or operations that involve crystallization
- Process engineers interested in learning about the logical and systematic approach for synthesizing and developing crystallization processes

### Your Instructor:

Christiano Wilbowo

**Please refer to index on p. 60 for all instructor bios.**

## AICHE's Flow of Solids in Bins, Hoppers, Chutes and Feeders



[www.aiche.org/els102](http://www.aiche.org/els102)

Course No.: ELS102  
 Course Length: 10 hours  
 CEUs: 1.0 PDHs: 10  
 AIChE Members – \$695  
 Non-Members – \$995



This online course provides a fundamental grounding in the key areas of bulk solids handling equipment selection, design, and troubleshooting. Strategies for alleviating costly flow problems in silos, bins, hoppers, feeders, and transfer chutes are presented, as well as proven techniques to design solids handling equipment to operate efficiently, safely, and reliably.

The lectures are supplemented with practical examples and actual industrial case histories to illustrate the complex concepts taught.

### You Will Learn:

- Bulk solids handling fundamentals
- Flow patterns in bins and hoppers
- Flow properties and their application to design/troubleshooting
- Fine powder handling phenomena
- Common segregation mechanisms for powders and solids
- Proven solutions with segregation for powders and solids

### Who Should Attend:

Those involved with designing, troubleshooting, maintaining, or purchasing bulk solids handling equipment:

- Plant and project managers
- Operation or process managers
- Project and maintenance engineers
- Personnel new to the field of bulk solids handling

### Your Instructor:

Eric Maynard

Register online at [www.aiche.org/academy](http://www.aiche.org/academy) or call 1-800-242-4363 (or 1-203-702-7660 outside the U.S.)

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## AICHE's Particle and Bulk Solids Characterization Technology



[www.aiche.org/ch763](http://www.aiche.org/ch763)

Course No.: CH763

Course Length: 2 Days

CEUs: 1.5 PDHs: 15

Available for In-Company Training; go to [www.aiche.org/incompany](http://www.aiche.org/incompany) for more information



Given the wide range of technologies available today for powder and particle characterization, selecting the best option for an application is not easy. Join particle characterization and technology experts Remi Trottier and Karl Jacob to gain a solid understanding of the basics of particle and bulk solids characterization necessary to properly select instruments and validate data, and for a look at the latest commercially available technologies.

In two days, you'll gain characterization and data interpretation skills to better control particulates, particulate formulation, suspensions and dispersions.

### You Will Learn:

- Instrument evaluation and proper selection
- Particle size and bulk powder data interpretation
- Ensemble and fractionation methods
- Single particle counting methods
- Measurement of bulk powder properties
- Method development and validation

### Who Should Attend:

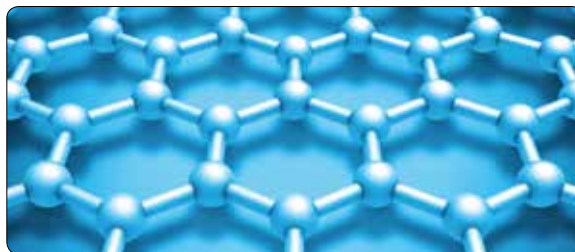
Scientists and engineers with little or no knowledge of particle and bulk solids characterization technology – including:

- Plant engineers
- Project engineers
- Project managers

### Your Instructors:

Karl V. Jacob and Remi Trottier

## AICHE's Particle Technology



[www.aiche.org/els106](http://www.aiche.org/els106)

Course No.: ELS106

Course Length: 20 hours

CEUs: 2.0 PDHs: 20

AICHE Members – \$795

Non-Members – \$1,095



The importance of knowledge of the science of particulate materials to the process industries cannot be overemphasized. Very often, difficulties in the handling or processing of powders are ignored or overlooked at the design stage, with the result that powder-related problems are the cause of an inordinate number of production stoppages.

This online course is intended as an introduction to particle technology. The topics included have been selected to give coverage of the broad areas of particle technology: particle size analysis, packed and fluidized beds, storage and transport (hopper design, pneumatic conveying, standpipes, slurry flow), separation (filtration and gas cyclones), and safety (fire and explosion hazards, health hazards).

### You Will Learn:

- Particle technology in the process industries
- Single particles in fluids
- Particle size measurement
- Flow of fluids through packed beds of particles
- Fluidization
- Pneumatic transport of powders

### Who Should Attend:

Engineers and scientists in process industries where particulate solids are handled and processed, including:

- Pharmaceutical, chemical and mineral processing
- Those new to working with powders

### Your Instructor:

Martin Rhodes

Register online at [www.aiche.org/academy](http://www.aiche.org/academy) or call 1-800-242-4363 (or 1-203-702-7660 outside the U.S.)

Key to icons: Bestseller Approved Basic Intermediate Advanced eLearning Public In-Company

# AICHE's Flow of Solids in Bins, Hoppers, Chutes and Feeders



[www.aiche.org/ch032](http://www.aiche.org/ch032)

Course No.: CH032

Course Length: 2 Days

CEUs: 1.5 PDHs: 15

AICHE Members – \$1,395

Non-Members – \$1,695



Too often, bulk solids are being handled without a good understanding of how to correctly design, select, troubleshoot, maintain and purchase bulk solids handling equipment. As a result, costly flow problems occur that slow production. In this course, you'll learn proven design and troubleshooting principles for handling bulk solids in bins, hoppers, feeders and transfer chutes for safe and trouble-free plant operation.

In two days, you'll review the fundamentals of bulk material flow and examine common flow problems, types of flow patterns in equipment and how flow properties of bulk solids are measured. You'll consider feeder design, learn proven troubleshooting techniques and gain insight into flow problems that occur when handling fine powders. The instructor also covers common mechanisms of segregation and solutions to these costly problems, and gives practical advice for using flow-aid devices.

Throughout the course, real-life industrial case histories will illustrate the complex concepts you'll learn. In addition, workshops help increase your understanding.

## You Will Learn:

- The pitfalls of poor bulk solids handling
- Common flow problems and their costly consequences
- The flow patterns and features of silos, bins and hoppers
- Testing bulk solids flow properties and how to use the results
- Solving ongoing bulk solids feeder problems

*"Super course. Instructor had great interpersonal skills with ability to keep a technical topic very interesting for 15 hours. Great job!"*

- Why fine powders can have restricted or uncontrolled flow rate
- Step-by-step procedures for designing a bin or silo
- Practical solutions to segregation mechanism problems
- Selecting the appropriate common flow-aid device
- How to avoid transfer chute plugging and how to minimize wear and dusting

## Who Should Attend:

Those involved in designing, selecting, troubleshooting, maintaining or purchasing bulk solids handling equipment – including:

- Plant and project managers
- Operation and process managers
- Project, process and maintenance engineers
- Unit operators and superintendents
- Anyone new to the field of bulk solids handling

## Your Instructor:

Eric Maynard, Herman Purutyany, Thomas Troxel or Dr. Andrés Orlando

Register online at [www.aiche.org/academy](http://www.aiche.org/academy) or call 1-800-242-4363 (or 1-203-702-7660 outside the U.S.)

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# AIChE's Pneumatic Conveying of Bulk Solids



**SAVE \$795 or more  
when you take CH032  
and CH033 together.**

Just register for course CH757:  
Flow of Solids/Pneumatic  
Conveying Combo Course.  
[www.aiche.org/ch757](http://www.aiche.org/ch757)

[www.aiche.org/ch033](http://www.aiche.org/ch033)

Course No.: CH033

Course Length: 1 Day

CEUs: 0.8 PDHs: 8.0

AIChE Members – \$995

Non-Members – \$1,295



Although many pneumatic conveying equipment advances have been made, costly problems – including wear, attrition, rate limitation and line plugging – continue to occur. Learn how to apply practical design and troubleshooting principles to improve the efficiency, safety and reliability of pneumatic conveying systems transporting powders and bulk solids.

In one day, you'll review the fundamentals of gas-solids flow and address common pneumatic conveying problems, modes of transport in a pipeline and scale-model tests and their use in systems design and evaluation of poorly operating systems. You'll discuss line chargers (feeders), proven pipeline layout rules and criteria for elbow/bend selection. The instructor will also cover more specialized topics, including dense phase conveying systems and gas-solids separators such as cyclones, filters and bag houses. Real-life industrial case histories will help increase your understanding of the theory and application taught.

## You Will Learn:

- Modes of conveying: Dilute phase and dense phase
- Types of systems: Positive pressure, vacuum, pull/push and closed loop
- The science underlying gas and solids flow through pipelines
- Understand key terms – like "saltation and pickup velocity" and "solids loading ratio"
- How to read a state diagram illustrating system performance

*"Great instructors with much experiential knowledge. I will recommend the course to others."*

- The four primary system components: Gas mover, silo/feeder, pipeline/bends and separator
- How to select elbows, line chargers and other key primary system components
- Know the features of solid separators – cyclones, filter/collectors and bag houses
- Dense phase conveying technology – what you need to know
- Troubleshooting common conveying problems – including wear, attrition, rate limitation and line plugging
- Applying safe handling practices for the pneumatic conveying of combustible solids

## Who Should Attend:

Engineers involved in designing, selecting, troubleshooting, maintaining or purchasing pneumatic conveying equipment – including:

- Plant and project managers
- Operation and process managers
- Project, process and maintenance engineers
- Unit operators and superintendents
- Professionals new to the field of pneumatic conveying

## Your Instructor:

Eric Maynard, Herman Purutyán, Thomas Troxel or Dr. Andrés Orlando

Register online at [www.aiche.org/academy](http://www.aiche.org/academy) or call 1-800-242-4363 (or 1-203-702-7660 outside the U.S.)

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## AICHE's Pneumatic Conveying of Bulk Solids



[www.aiche.org/ela111](http://www.aiche.org/ela111)

Course No.: ELA111  
 Course Length: 5 Hours  
 CEUs: 0.5 PDHs: 5.0  
 AIChE Members – \$495  
 Non-Members – \$795



Although many pneumatic conveying equipment advances have been made, costly problems – including wear, attrition, rate limitation and line plugging – continue to occur. This online course will help you learn how to apply practical design and troubleshooting principles to improve the efficiency, safety and reliability of pneumatic conveying systems transporting powders and bulk solids.

In this course, you will review the fundamentals of gas-solids flow and address common pneumatic conveying problems, modes of transport in a pipeline and scale-model tests and their use in systems design and evaluation of poorly operating systems. You'll discuss line chargers (feeders), proven pipeline layout rules and criteria for elbow/bend selection.

### You Will Learn:

- Modes of conveying: Dilute phase and dense phase
- Types of systems: Positive pressure, vacuum, pull/push and closed loop
- Understand key terms – like “saltation and pickup velocity” and “solids loading ratio”
- The four primary system components: Gas mover, silo/feeder, pipeline/bends and separator
- Dense phase conveying technology

### Who Should Attend:

Industrial plant operations and maintenance workers who need to have practical methods for identifying and managing physical and process hazards.

### Your Instructor:

Eric Maynard

**Please refer to index on p. 60 for all instructor bios.**

## Webinar Bundle

### Solids Webinar Bundle

Learn about properties of solids, classifying solids and pneumatic conveying. These webinars provide an overview of solids processing technology and highlight some of the issues faced when dealing with bulk solids.

This webinar bundle includes:

- The Science of Classifying Solids: Screening Technology
- Understanding Why Bulk Solids Behave Differently Than Liquids
- Introduction to the Pneumatic Conveying of Solids
- Introduction to Solids Processing and Particle Technology
- Storage and Flow of Bulk Solids

**Pricing:** AIChE Member Credits - 4  
 AIChE Members - \$276.00  
 Non-Members - \$396.00

Register online at [www.aiche.org/academy](http://www.aiche.org/academy) or call 1-800-242-4363 (or 1-203-702-7660 outside the U.S.)

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## Conference Presentations

### AICHe Annual Meeting 2014 Recording Bundle – International Congress on Energy (ICE)

This bundle comprises 133 select papers delivered at the 2014 AICHe Annual Meeting. It includes presentations related to technology, markets, business strategies and policy covering the solar, nuclear, lignocellulosics, biorefineries, hydrogen production, hydrogen storage and green innovation energy sectors.

**Pricing:** AICHe Member Credits - 3  
AICHe Members - \$249.00  
Non-Members - \$349.00

### AICHe Annual Meeting 2013 Recording Bundle – International Congress on Energy (ICE)

This bundle comprises 151 select papers delivered at the 2013 AICHe Annual Meeting. It includes presentations related to technology, markets, business strategies and policy covering the solar, nuclear, lignocellulosics, biorefineries, hydrogen production, hydrogen storage and green innovation energy sectors.

**Pricing:** AICHe Member Credits - 3  
AICHe Members - \$249.00  
Non-Members - \$349.00

### AICHe Annual Meeting 2012 Recording Bundle – International Congress on Energy (ICE)

This bundle comprises 44 select papers delivered at the 2012 AICHe Annual Meeting, are presentations related to technology, markets, business strategies and policy covering the solar, nuclear, lignocellulosics, biorefineries, hydrogen production, hydrogen storage and green innovation energy sectors.

**Pricing:** AICHe Member Credits - 3  
AICHe Members - \$249.00  
Non-Members - \$349.00

### AICHe Annual Meeting 2011 Recording Bundle – International Congress on Energy (ICE)

This bundle comprises 76 select papers delivered at the 2011 AICHe Annual Meeting, are presentations related to technology, markets, business strategies and policy covering the solar, nuclear, lignocellulosics, biorefineries, hydrogen production, hydrogen storage and green innovation energy sectors.

**Pricing:** AICHe Member Credits - 3  
AICHe Members - \$249.00  
Non-Members - \$349.00

## Webinar Bundle

### Energy Markets Webinar Bundle

Review the complex relationship between the chemical industry and market demands. These webinars also describe and evaluate the technical, political, and economic challenges involved with widespread adoption of renewable energy technologies.

This webinar bundle includes:

- The Water-Energy Nexus: Emerging Issues and Challenges
- Challenges for Global Energy
- A Perspective on the World's Energy Challenge
- Changes in the Energy Market and Their Impact on the Chemical Industry

**Pricing:** AICHe Member Credits - 3  
AICHe Members - \$207.00  
Non-Members - \$297.00

**Not a member of AICHe? For more information about joining AICHe, go to [www.aiche.org](http://www.aiche.org) and click Join.**

Register online at [www.aiche.org/academy](http://www.aiche.org/academy) or call 1-800-242-4363 (or 1-203-702-7660 outside the U.S.)

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## CCPS' 20 Elements of Risk Based Process Safety (RBPS)



[www.aiche.org/ela120](http://www.aiche.org/ela120)

Course No.: ELA120

Course Length: 18 Hours

CEUs: 1.8 PDHs: 18

AIChE Members and Employees of CCPS Member Companies – \$895

Non-Members – \$1,195



This online course will introduce you to the CCPS Risk Based Process Safety Management (RBPS) approach, described in the CCPS book *Guidelines for Risk-Based Process Safety, 2007*. It covers the four pillars and twenty elements that define the structure of the RBPS approach. The course will help you design, implement, and maintain a risk based process safety management system that will fit your company's needs and resources.

You will learn the definition and importance of RBPS and learn the four pillars of RBPS. Key principles and essential features for each of the twenty elements that make up the pillars will be discussed.

The four pillars are:

1. Commit to process safety
2. Understand hazards and risks
3. Manage risk
4. Learn from experience

### You Will Learn:

- The importance of RBPS and how it fits into business success
- The details of the twenty elements of RBPS
- How to design, implement, and maintain an RBPS management system that fits the culture, needs and resources of your company, and that will meet the company's process safety goals

### Who Should Attend:

Those involved in designing, implementing and maintaining a successful process safety management system in your company, including:

- Process safety specialists and process safety managers
- Operations and plant managers
- Engineers and supervisors

### Your Instructors:

This course was developed by 30 renowned Process Safety experts.

**For information about your company becoming a member of CCPS, go to [www.aiche.org/ccps](http://www.aiche.org/ccps) and click Join.**

Register online at [www.aiche.org/academy](http://www.aiche.org/academy) or call 1-800-242-4363 (or 1-203-702-7660 outside the U.S.)

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## Conference Presentations

### CCPS 11th Global Congress on Process Safety 2015 Recording Bundle

This bundle comprises 106 select papers delivered at 2015's 11th Global Congress on Process Safety, cover process safety management and its components in depth.

**Pricing:** AIChE Member Credits - 3  
AIChE Members - \$249.00 Non-Members - \$349.00

### CCPS 10th Global Congress on Process Safety 2014 Recording Bundle

This bundle comprises 90 select papers delivered at 2014's 10th Global Congress on Process Safety. The presentations cover process safety management and its components in depth.

**Pricing:** AIChE Member Credits - 3  
AIChE Members - \$249.00 Non-Members - \$349.00

### CCPS 9th Global Congress on Process Safety 2013 Recording Bundle

This bundle comprises 115 select papers delivered at 2013's 9th Global Congress on Process Safety. The presentations cover process safety management and its components in depth.

**Pricing:** AIChE Member Credits - 3  
AIChE Members - \$249.00 Non-Members - \$349.00

### CCPS 8th Global Congress on Process Safety 2012 Recording Bundle

This bundle comprises 67 select papers delivered during 2012's 8th Global Congress on Process Safety, cover process safety management and its components in depth.

**Pricing:** AIChE Member Credits - 3  
AIChE Members - \$249.00 Non-Members - \$349.00

### CCPS 7th Global Congress on Process Safety 2011 Recording Bundle

This bundle comprises 67 select papers delivered during 2011's 7th Global Congress on Process Safety, cover process safety management and its components in depth.

**Pricing:** AIChE Member Credits - 3  
AIChE Members - \$249.00 Non-Members - \$349.00

### CCPS 6th Global Congress on Process Safety 2010 Recording Bundle

This bundle comprises 75 select papers delivered during 2010's 6th Global Congress on Process Safety, cover process safety management and its components in depth.

**Pricing:** AIChE Member Credits - 3  
AIChE Members - \$249.00 Non-Members - \$349.00

## Webinar Archives

### Dust Explosions

**Pricing:** AIChE Member Credits - 1  
AIChE Members - \$69.00 Non-Members - \$99.00

<http://www.aiche.org/dust>

## AIChE's Combustible Dust Hazards: Flash Fires and Dust Explosions



[www.aiche.org/ch034](http://www.aiche.org/ch034)

Course No.: CH034

Course Length: 2 Days

CEUs: 1.5 PDHs: 15

Available for In-Company Training; go to [www.aiche.org/incompany](http://www.aiche.org/incompany) for more information



Dust hazards and explosions are all too common in the process safety industry and can lead to injuries, fatalities, property damage, business interruption, and environmental pollution.

Join combustible dust expert Dr. Erdem Ural for an up-to-the-minute look at how to identify, respond to, control and eliminate dust hazards while fulfilling your regulatory obligations as an employer.

In two days, you'll learn how OSHA's Combustible Dust National Emphasis Program addresses dust explosions and fire hazards in facilities and impacts how you handle powder and bulk materials, as well as fugitive dust in your plant.

### You Will Learn:

- How to spot dust explosion hazards hidden in many workplaces
- Tools to help you identify and assess the existence, severity and consequences of a hazard
- How to control and eliminate hazards
- Assessing the adverse effects of protection and prevention systems

### Who Should Attend:

Professionals concerned with the risks and vulnerabilities associated with dust hazards and explosions – including:

- Chemical engineers
- Mechanical engineers
- Process engineers/scientists
- Fire protection professionals
- Plant/process safety/risk managers
- Facility managers and all others who need to be aware of the risks and vulnerabilities in plants

### Your Instructor:

Dr. Erdem Ural

Register online at [www.aiche.org/academy](http://www.aiche.org/academy) or call 1-800-242-4363 (or 1-203-702-7660 outside the U.S.)

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## CCPS' HAZOP Studies and Other PHA Techniques for Process Safety and Risk Management



[www.aiche.org/ch157](http://www.aiche.org/ch157)

Course No.: CH157

Course Length: 3 Days

CEUs: 2.3 PDHs: 23

AICHe Members and Employees of  
CCPS Member Companies – \$1,795  
Non-Members – \$2,095



Process Hazard Analysis (PHA) goes beyond merely identifying whether a hazard exists. It involves understanding the negative impact of the hazard in the workplace and how to eliminate it. Join hazard risk/evaluation expert Robert Johnson as he addresses how to prepare for, conduct and report an effective PHA while complying with the latest regulations. Attend and you'll receive the CCPS book *Guidelines for Hazard Evaluation Procedures, 3rd Edition*, which you can refer back to on the job for a refresher of the effective evaluation methods process safety demands.

In three days, you'll get up to date on your obligations under the OSHA PSM Rule and EPA RMP regulations. You'll learn how to determine the adequacy of your safeguards and report findings and recommendations. You'll examine various hazard evaluation methods, including the HAZOP Study, and how to select the method appropriate for your facility. The course concludes with a look at hazard evaluation of procedure-based operations and PLC-controlled processes, conducting the final meeting and quality check, and reporting techniques.

After three days, you'll know how to select and apply various PHA methods and have the knowledge and skills necessary to more effectively lead PHA teams and manage process safety in your organization.

*"Very good information. Instructor was very knowledgeable, clear, and easy to follow. He covered a lot of content in 3 days at a decent pace, and left plenty of time to answer questions clearly."*

–Amanda Sistilli - ERCO Worldwide

### You Will Learn:

- The anatomy of a process safety incident
- Hazard review logistics – preparation, team leading, reporting and follow-up
- OSHA and EPA requirements for PHAs
- Tips for leading common PHA methods – including those used for procedure-based operations
- The HAZOP Study: Fundamental concepts and methodology
- Tools and techniques for analyzing scenario risks and determining the adequacy of safeguards

### Who Should Attend:

Engineers and other technical professionals who play key roles in the management of their organization's process safety. Those who should attend include PHA team leaders and other professionals who must know how to select and apply various PHA methods.

### Your Instructor:

Robert Johnson

Register online at [www.aiche.org/academy](http://www.aiche.org/academy) or call 1-800-242-4363 (or 1-203-702-7660 outside the U.S.)

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## CCPS' Advanced Concepts for Process Hazard Analysis



**SAVE \$995 or more  
when you take CH157 and  
CH754 together.**

Just register for course CH759:  
CCPS' HAZOP Studies, Other  
Hazard Evaluation Procedures and  
Advanced Concepts for Process  
Hazard Analysis Combo Course.  
[www.aiche.org/ch759](http://www.aiche.org/ch759)

[www.aiche.org/ch754](http://www.aiche.org/ch754)

Course No.: CH754

Course Length: 2 Days

CEUs: 1.5 PDHs: 15

AIChE Members and Employees of

CCPS Member Companies – \$1,395

Non-Members – \$1,695



Safety demands a deep knowledge and application of effective hazard analysis methods. In this highly interactive course, you'll have the opportunity to expand your basic understanding of process hazard analysis and learn how to extend order-of-magnitude scenario risk calculations to other uses. Join Robert W. Johnson, take a detailed look at the HAZOP Study and other PHA methods, and engage in exercises that give you hands-on experience applying key concepts learned. You may take this advanced course sequentially with CCPS' HAZOP Studies and Other PHA Techniques for Process Safety and Risk Management (CH157) or separately.

In two days, you'll work with a team to learn and practice the PHA techniques, including Layer of Protection Analysis (LOPA), Safety Integrity Levels (SILs) determination and analysis of chemical reactivity hazards and security risks. Using a spreadsheet provided during the course, you'll extend qualitative HAZOP Studies to evaluate order-of-magnitude scenario risks, then examine the concept of importance measures applied to PHAs and how to use a PHA to determine required SILs. You'll conclude the course by surveying tools useful in PHAs for evaluating fire, explosion and toxic release impacts. A laptop is required for this course.

When you attend this course, you'll also receive the CCPS book *Guidelines for Initiating Events and Independent Protection Layers in Layer of Protection Analysis*.

*"Well prepared and delivered by a very knowledgeable instructor."*

*–Michael Welch*

### You Will Learn:

- How to calculate action item importance measures
- How to determine the safety integrity levels for a safety-instrumented system
- Strategies for reporting your study results

### Who Should Attend:

Any engineer who conducts or is involved in process safety hazard analysis – including:

- Chemical engineers
- Mechanical engineers
- Process engineers
- Process safety/risk managers
- Facility managers

### Your Instructor:

Robert Johnson

**Please refer to index on p. 60 for all instructor bios.**

Register online at [www.aiche.org/academy](http://www.aiche.org/academy) or call 1-800-242-4363 (or 1-203-702-7660 outside the U.S.)

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## DIERS' Basic Emergency Relief System Design



[www.aiche.org/ch172](http://www.aiche.org/ch172)

Course No.: CH172  
 Course Length: 3 Days  
 CEUs: 2.3 PDHs: 23  
 AIChE Members – \$1,795  
 Non-Members – \$2,095



Take the first step in becoming proficient in the ERS design and evaluation. In three days, you'll gain an introduction to pressure relief safety design with Design Institute Emergency Relief Systems (DIERS) technology. This course is recommended prior to taking DIERS' Advanced Emergency Relief System Design. Together the two DIERS courses form the basis of a solid fundamental understanding of pressure safety relief design.

The course includes coverage of DIERS liquid vapor disengagement technology, two-phase vapor liquid flow through relief systems, and techniques for reactive relief design. From state-of-the-art venting and flow technology to relief system piping, you'll gain information that will be invaluable, whether you operate, design or manage chemical processes that require emergency overpressure relief devices.

### You Will Learn:

- An introduction to the broad topic of emergency relief system design
- How to achieve compliance with established codes, standards and design practices in the broad area of emergency pressure relief and effluent containment.
- How fluid flow models are used in pressure safety relief design
- The requirements for relief system piping.
- Conservative assumptions typically made to determine the required load for pressure relief systems

- Where to obtain resources and references to guide further development as a skilled ERS engineer
- The first steps to becoming proficient in the complex field of ERS design and evaluation

### Who Should Attend:

This introductory course is designed to meet the needs of engineers responsible for operating, designing or managing chemical processes that require overpressure relief devices. It will also be beneficial to engineers seeking more information about state-of-the-art venting and flow technology and those responsible for the safe handling of the effluent from an emergency relief device.

### Your Instructors (2 of these):

Todd Brandes, Dilip Das, Rahul Raman, Dan Smith

## Webinar Archives

### CCPS' An Introduction to Methods of Process Safety Hazard Assessment

**Pricing:** AIChE Member Credits - 1  
 AIChE Members - Free  
 Non-Members - \$99.00

<http://www.aiche.org/process>

Register online at [www.aiche.org/academy](http://www.aiche.org/academy) or call 1-800-242-4363 (or 1-203-702-7660 outside the U.S.)

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## DIERS' Advanced Emergency Relief System Design



[www.aiche.org/ch173](http://www.aiche.org/ch173)

Course No.: CH173

Course Length: 3 Days

CEUs: 2.3 PDHs: 23

AICHe Members – \$1,795

Non-Members – \$2,095



OSHA has recognized Design Institute for Emergency Relief Systems (DIERS) methods as good engineering practice for process safety management of highly hazardous materials.

If you're responsible for the safe handling of the effluent from relief systems, this course will teach you how to apply the DIERS techniques for providing adequate pressure relief for runaway reactions and other pressure-producing events.

### Applying DIERS technology in your facility

This advanced course covers the Design Institute for Emergency Relief Systems (DIERS) techniques for providing adequate pressure relief for runaway reactions and other pressure-producing events that result in two-phase flow. Each participant receives the texts: *Emergency Relief Systems Design Using DIERS Technology* (published by AIChE) and *Guidelines for Pressure Relief and Effluent Handling Systems* (published by CCPS and includes CCflow computer routines available by download).

### You Will Learn to:

- The broad topic of emergency relief systems design, with an emphasis on DIERS methodology
- How to achieve compliance with established codes, standards and design practices in the broad area of emergency pressure relief and effluent containment
- The application of the DIERS technology for data acquisition and two-phase venting calculations for the severe case of runaway chemical reactions
- Available computational models and computer programs through demonstrations and worked examples
- To utilize real-world scenarios, see how lack of knowl-

edge on basic pressure relief systems principles can have fatal consequences

- The first steps to becoming proficient in the complex field of ERS design and evaluation

Follow-up work will be required to gain proficiency in the application of this complex technology. The course texts and extensive notes serve as study guides.

### Who Should Attend:

Engineers responsible for operating, designing or managing chemical processes that require emergency overpressure relief devices to ensure the safety of the facility in the event of runaway reactions or other pressure-producing events. Engineers who want to learn more about state-of-the-art venting and flow technology. Those responsible for the safe handling of the effluent from an emergency relief device will find this course invaluable.

### Prerequisites

The course assumes that the attendees have thorough understanding and real-world experience working with the basic chemical engineering principles of reaction kinetics, fluid flow, thermodynamics, heat transfer, mass transfer, and heat and material balances. Further, some application of these disciplines in basic emergency relief systems design or evaluation is expected. Recommend taking CH172 prior to attending.

### Your Instructors (2 of these):

Robert D'Alessandro, William Ciolek, Dr. Theodore Nelson, and Benjamin McDavid

Register online at [www.aiche.org/academy](http://www.aiche.org/academy) or call 1-800-242-4363 (or 1-203-702-7660 outside the U.S.)

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## CCPS' Hazard Identification for Operations and Maintenance Workers



[www.aiche.org/ch166](http://www.aiche.org/ch166)

Course No.: CH166

Course Length: 2 Days

CEUs: 1.5 PDHs: 15

Available for In-Company Training; go to [www.aiche.org/incompany](http://www.aiche.org/incompany) for more information



This seven-module course provides participants with the knowledge and skills to more effectively identify process and mechanical hazards in the workplace, as well as strategize a method for dealing with them.

The course follows a workshop format with several videos, case studies and team breakout exercises. Quizzes are conducted at the end of each module to ensure that participants have a good grasp of the material that was covered. The instructor-led course includes exclusive content not available in the eLearning format.

### You Will Learn:

- Introduction to hazards and hazard identification
- Physical and mechanical hazards
- Hazard recognition techniques
- Process hazards
- Use of human senses to identify hazards
- Work hazards
- Hazard evaluation and ranking

### Who Should Attend:

- Process operators
- Maintenance craftsmen
- Engineers
- Production foremen and safety specialists

### Your Instructor:

Brian Kelly

## CCPS' Hazard Identification for Operators and Maintenance Workers



Course content updated and coming soon in Spanish

[www.aiche.org/ela121](http://www.aiche.org/ela121)

Course No.: ELA121

Course Length: 5 Hours

CEUs: 0.5 PDHs: 5.0

AICHE Members and Employees of CCPS Member Companies – \$59  
Non-Members – \$79



This online course helps operators learn how to recognize and respond to hazards at the field level. Attendees learn how to identify, rank and address the physical and process safety hazards they may encounter in the workplace. Process hazards are less obvious than physical hazards and can't always be detected at first glance. As a result, additional effort and different approaches may be required to identify process hazards so that they are addressed appropriately.

### You Will Learn:

- Introduction to hazards
- Physical and process hazards
- Human behavior
- Addressing and preventing hazards

### Who Should Attend:

Industrial plant operations and maintenance workers who need to have practical methods for identifying and managing physical and process hazards. It could also benefit people who are:

- Planning on participating in a formal Process Hazard Analysis (PHA) or safety review
- Responsible for providing resources for hazard control and elimination
- Safety inspectors or regulators
- Safety professionals

### Your Instructors:

This course was authored by 12 world-renowned process safety experts.

Register online at [www.aiche.org/academy](http://www.aiche.org/academy) or call 1-800-242-4363 (or 1-203-702-7660 outside the U.S.)

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## [www.aiche.org/els104](http://www.aiche.org/els104)

Course No.: ELS104

Course Length: 10 Hours

CEUs: 1.0 PDHs: 10

AIChE Members and Employees of CCPS Member Companies – \$695

Non-Members – \$995



This online course covers the concepts and techniques of the Hazard and Operability (HAZOP) Study methodology, including related matters of preparation, team meeting facilitation and reporting. It includes worked examples and references to additional resources.

Attendees will learn the anatomy of process safety incidents, including process hazard analysis terminology, the basic HAZOP Study approach to developing potential incident scenarios, the estimating of scenario risk as a means to determining the adequacy of safeguards, the application of the HAZOP Study method to procedure-based operations, and the logistical aspects of planning and executing a HAZOP Study team review. This course is the culmination of over 25 years of teaching and employing the HAZOP Study methodology in a variety of process industries, by the lead contract author of CCPS' *Guidelines for Hazard Evaluation Procedures, Third Edition*, and the instructor of the AIChE continuing education course on "HAZOP Studies and other PHA Techniques for Process Safety and Risk Management."

### You Will Learn:

- The anatomy of process safety incidents
- The HAZOP Study method for scenario development
- Continuous-process example
- Determining the adequacy of safeguards
- Developing findings and recommendations

- Variations on the basic HAZOP Study method
- Application to procedure-based operations
- Batch-operation example
- Preparing for and leading HAZOP Study team reviews
- Updating and revalidating HAZOP Studies

### Who Should Attend:

This course is not intended to replace full HAZOP team leader (facilitator) training, but it is a good refresher for anyone who has led HAZOP Studies, as well as for:

- HAZOP Study team members
- Coordinators of process safety management programs
- Professionals responsible for addressing the findings and recommendations generated by HAZOP Study teams

### Your Instructor:

Robert Johnson

Please refer to index on p. 60 for all instructor bios.

Register online at [www.aiche.org/academy](http://www.aiche.org/academy) or call 1-800-242-4363 (or 1-203-702-7660 outside the U.S.)

Key to icons: ★ Bestseller ✓ Approved B Basic I Intermediate A Advanced E eLearning P Public In-Company

## CCPS' Incident Investigation



[www.aiche.org/ch850](http://www.aiche.org/ch850)

Course No.: CH850

Course Length: 3 Days

CEUs: 2.3 PDHs: 23

Available for In-Company Training: go to [www.aiche.org/incompany](http://www.aiche.org/incompany) for more information



Accidents are significant events that trace their roots back to management system failures. They often result from a single failure. That failure, however, may be a symptom of deeper problems within the operation of a plant or facility. Only with a full understanding of what happened, how it happened and why it happened can effective remedial actions be taken. Join incident investigation expert Brian Kelly for an in-depth look at the systematic process of examining and evaluating the causes of an incident.

In three days, you will learn how to set up and manage an investigation, discover evidence preservation and witness interviewing techniques and examine causal analysis and ways to establish root cause(s).

### You Will Learn:

- Incident reporting
- Trend analysis and pattern recognition
- How to set up and staff a formal investigation
- How to conduct a root cause analysis
- Formal reporting and presentation

### Who Should Attend:

Professionals concerned with the risks associated with dust hazards and explosions – including:

- Chemical and mechanical engineers
- Process engineers/scientists
- Fire protection professionals
- Facility/process safety/risk managers

### Your Instructor:

Brian Kelly

Please refer to index on p. 60 for all instructor bios.

## CCPS' Inherently Safer Design



[www.aiche.org/ch800](http://www.aiche.org/ch800)

Course No.: CH800

Course Length: 1 Day

CEUs: 0.8 PDHs: 8.0

Available for In-Company Training: go to [www.aiche.org/incompany](http://www.aiche.org/incompany) for more information



Inherently safer product and process design (ISD) is a way to eliminate or significantly reduce hazards—rather than develop add-on protective systems and procedures. You'll examine risk management layers of protection—inherent, passive, active and procedural—and how and why to build features from all categories into your program. By the end of the course, you'll have the tools, resources and knowledge to build safety into any phase in the life cycle of a chemical process and eliminate or significantly minimize hazards to protect your people, the environment and your business.

### You Will Learn:

- What is inherently safer design?
- The history of ISD and lessons to be learned
- Basic concepts and philosophy
- The process safety management hierarchy
- Strategies for identifying inherently safer options
- Tools and resources to help you implement ISD

### Who Should Attend:

Professionals responsible for or involved in process development, design and operation, including:

- Chemical engineers
- Mechanical engineers
- Process engineers and scientists
- Chemists

### Your Instructor:

Dennis C. Hendershot

Register online at [www.aiche.org/academy](http://www.aiche.org/academy) or call 1-800-242-4363 (or 1-203-702-7660 outside the U.S.)

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## Webinar Bundle

### Laboratory Safety Webinar Bundle

This webinar bundle on laboratory safety focuses on lessons from the T2 Laboratories disaster. You will also learn the model codes for the storage and use of hazardous materials in a chemical facility, as well as learn how industry handles reactive chemical hazards.

This webinar bundle includes:

- Laboratory and Industrial Hazardous Chemical Safety: A Code-Based Approach
- Explosion at T2 Laboratories
- Teaching Reactive Chemical Hazards to Chemical Engineers

**Pricing:** AIChE Member Credits - 2  
AIChE Members - \$138.00  
Non-Members - \$198.00

## CCPS' Layer of Protection Analysis (LOPA)



[www.aiche.org/ela109](http://www.aiche.org/ela109)

Course No.: ELA109  
Course Length: 8 Hours  
CEUs: 0.8 PDHs: 8.0  
AIChE Members and Employees of  
CCPS Member Companies – \$595  
Non-Members – \$895

Course content  
updated



This online course presents the Layer of Protection Analysis (LOPA) methodology used worldwide in the process industries for simplified, rule-based risk analysis. The course covers the basic LOPA approach to selecting and analyzing potential incident scenarios.

You will learn the finer points of topics such as enabling conditions and conditional modifiers, as well as the logistical aspects of planning and executing a LOPA study, including documentation and program management. You'll also gain CCPS guidance on initiating events, independent protection layers, enabling conditions and conditional modifiers — including the likelihood of ignition.

### You Will Learn:

- Introducing the LOPA approach
- Selecting scenarios for analysis
- Executing each step of the LOPA method for scenario risk analysis
- Identifying and evaluating independent protection layers
- Understanding and applying enabling conditions and conditional modifiers
- Closing the risk gap
- Documenting the analysis
- Managing LOPA implementation, updates and follow-up

### Who Should Attend:

Hazard evaluation teams, dedicated site or corporate LOPA teams, and those who manage LOPAs, as well as expert analysts and safety teams.

### Your Instructor:

Robert Johnson

For information about your company becoming a member of CCPS, go to [www.aiche.org/ccps](http://www.aiche.org/ccps) and click Join.

Register online at [www.aiche.org/academy](http://www.aiche.org/academy) or call 1-800-242-4363 (or 1-203-702-7660 outside the U.S.)

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# CCPS' Managing Process Safety Risks During Organizational Change



[www.aiche.org/ch525](http://www.aiche.org/ch525)

Course No.: CH525

Course Length: 2 Days

CEUs: 1.5 PDHs: 15

Available for In-Company Training; go to [www.aiche.org/incompany](http://www.aiche.org/incompany) for more information



Organizational change is normal and inevitable as companies seek to become more profitable, increase market share, and reduce manufacturing costs. When not properly evaluated and controlled, changes to equipment in a facility can lead to serious incidents with potentially severe consequences. However, because the effects of organizational change on process safety can be harder to see, it is less commonly recognized than other types of change.

Acquisitions, mergers and joint ventures, new and revised corporate policies and procedures, task allocation changes, changes in job responsibilities, loss of key personnel, or even changes in shift hours can have an adverse impact on process safety. Because there is a tendency to focus on managing physical changes, most Management of Change (MOC) systems overlook or only superficially address Organizational Change Management (OCM) and the impact of organizational changes on process safety.

This course provides an in-depth understanding of the framework for establishing OCM programs and implementing OCM procedures for different types of changes. You'll also learn effective utilization of OCM risk analysis methods/tools for evaluating organizational changes through illustrated case studies and lessons learned, including:

- Modification of working conditions
- Personnel changes
- Task allocation changes
- Organizational hierarchy changes
- Organizational policy changes

The course focuses on effective utilization of the following OCM risk analysis methods/tools for evaluating organizational changes:

- What-if analysis
- Checklist approach
- Bow tie method
- Activity mapping

### You Will Learn:

- Organizational change key concepts and definitions: A selection of Organizational Change Management (OCM)-related incidents
- Corporate standards for OCM
- How to conduct OCM risk assessment
- Tools and techniques for analyzing organizational changes

### Who Should Attend:

Process safety professionals and managers who play key roles in evaluating and managing process safety risks during organizational change.

### Your Instructors:

Charles Cowley, Umesh Dhake or Louisa Nara

Register online at [www.aiche.org/academy](http://www.aiche.org/academy) or call 1-800-242-4363 (or 1-203-702-7660 outside the U.S.)

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## Webinar Bundle

### Overpressure Protection Webinar Bundle

Learn about explosion protection and the principle of flammability of vapor-air mixtures. Also learn about pressure relief valves and gas-liquid fluids in pipe flow.

This webinar bundle includes:

- Two-Phase Gas-Liquid Pipe Flow and Relief Sizing
- Explosion Protection with In-Line Flame Arresters
- Flame Flashbacks: Causes and Prevention
- Pressure Relief Valve Sizing Equations Basics

**Pricing:** AIChE Member Credits - 3  
AIChE Members - \$207.00  
Non-Members - \$297.00

## CCPS' Overview of Risk Based Process Safety



[www.aiche.org/ch925](http://www.aiche.org/ch925)

Course ID: CH925

Course Length: 2 Days

CEUs: 1.5 PDHs: 15

Available for In-Company Training; go to [www.aiche.org/incompany](http://www.aiche.org/incompany) for more information



This course will introduce you to CCPS' Risk Based Process Safety (RBPS) approach, including the four pillars and twenty elements that define the structure for the RBPS approach. Developed especially for companies to train employees in the basics of Risk Based Process Safety, this course will serve as an excellent starting point for the exploration of the steps and procedures involved in providing a safe operating environment.

### You Will Learn:

- The definition and importance of Risk Based Process Safety (RBPS)
- The Four Pillars of RBPS:
  - Commit to Process Safety
  - Understand Hazards and Risk
  - Manage Risk
  - Learn from Experience
- The Twenty Elements of RBPS

### Who Should Attend:

Those involved in designing, implementing and maintaining a successful process safety management system including:

- Process safety specialists and process safety managers
- Operations and plant managers
- Engineers and supervisors

### Your Instructors:

Donald Abrahamson, Dennis Hendershot, John Herber, John Murphy or Louisa Nara

**For information about your company becoming a member of CCPS, go to [www.aiche.org/ccps](http://www.aiche.org/ccps) and click Join.**

Register online at [www.aiche.org/academy](http://www.aiche.org/academy) or call 1-800-242-4363 (or 1-203-702-7660 outside the U.S.)

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## CCPS' Process Safety Boot Camp

[www.aiche.org/ch900](http://www.aiche.org/ch900)

Course No.: CH900

Course Length: 4 days

CEUs: 3.2 PDHs: 32

AIChE Members and Employees of CCPS Member Companies – \$2,095

Non-Members – \$2,395



CCPS' Process Safety Boot Camp is an intensive and highly interactive 4-day course which is designed to quickly bring chemical engineers up to speed on the fundamentals of process safety. The course includes numerous case studies and workshop problems to reinforce the topics presented.

Process Safety Boot Camp was developed by AIChE's Center for Chemical Process Safety (CCPS) especially for companies looking to train chemical engineers in the fundamentals of process safety. It is widely used by corporate training departments across different sectors of the chemical enterprise. Companies large, small and in between use the Process Safety Boot Camp to ramp up staff knowledge to a common level quickly and easily.

This intensive 4-day course is also offered periodically throughout the year to the broader chemical engineering public.

Every Boot Camp is taught by two instructors, each with a minimum of 25 years experience. They cover key process safety areas, including Risk Based Process Safety, Process Hazard Analysis, Regulatory Compliance and Process Safety in Plant and Design Operations.

### You Will Learn:

- The Four Pillars and 20 Elements of Risk Based Process Safety
- The different types of Process Hazard Analysis, including an introduction to HAZOP
- An overview of OSHA's PSM regulations and EPA's RMP regulations
- How to incorporate Process Safety Management into Process Design and Plant Operations

- The concept of Layers of Protection to prevent and/or mitigate loss-of-containment events
- The principles of Risk Analysis and Risk Management
- How to consider Inherently Safer Processes during plant design

### Who Should Attend:

- Process engineers, project engineers, operations engineers, and safety engineers that need to move beyond an understanding of personnel safety and learn the basics of Process Safety and Process Safety Management
- Chemical engineers who interface with design teams, plant engineers, or plant operations personnel

### Your Instructors (2 of these):

Donald Abrahamson  
James Conner  
Steve Eason  
Walter Frank  
Alexandre Glitz  
Dennis C. Hendershot  
John Herber  
Jerry Jones  
Brian Kelly  
Ellen Lenz

Jack McCavit  
John Murphy  
Louisa Nara  
Albert Ness  
Norman Nibber  
Frank Renshaw  
Robert Rosen  
Richard Sarnie  
Néstor Sposito  
Byron Sun

Register online at [www.aiche.org/academy](http://www.aiche.org/academy) or call 1-800-242-4363 (or 1-203-702-7660 outside the U.S.)

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## Course Overview:

### Day 1

- Introduction
  - Occupational safety vs. process safety
  - Business case for process safety
  - Key principles of process safety
- Anatomy of an Incident
  - Containment and control
  - Prevention
  - Mitigation

### Day 2

- Introduction to Management Systems and Risk-Based Process Safety
- Process Safety Culture Compliance with Standards
- Inherently Safer Concepts
  - Process design
- Process Safety Competency
  - Workforce involvement
  - Human factors
- Stakeholder Outreach
- Process Knowledge Management
- Understanding Material Hazards

### Day 3

- Specific Hazards
  - Chemical hazards
  - Reactivity
  - Toxicity
  - Corrosivity
  - Inherent safety

- Hazard Identification and Risk Analysis
  - Hazard evaluation techniques
  - Consequence and impact frequency
  - Risk analysis
  - Risk criteria
  - Risk acceptance
- Operating Procedures
- Safe Work Practices

### Day 4

- Hot Work Permits, etc.
- Asset Integrity and Reliability
- Contractor Management
- Training and Performance Assurance
- Management of Change (MOC)
- Operational Readiness PSSR
- Conduct of Operations
- Emergency Management and Incident Investigation
- Measures, Metrics and Auditing Compliance
- Management Review and Continuous Improvement
- Additional EPA RMP regulations

## Interested in taking this course outside of North America?

Please register for Foundations of Process Safety course at [www.aiche.org/ch910](http://www.aiche.org/ch910)

Register online at [www.aiche.org/academy](http://www.aiche.org/academy) or call 1-800-242-4363 (or 1-203-702-7660 outside the U.S.)

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# Train Your Chemical Engineering Staff

When you're looking for chemical engineering training turn to the AIChE Academy. You'll find courses covering a wide range of chemical engineering, process safety and biological engineering topics.

Every course in the AIChE Academy was developed by experts from the **American Institute of Chemical Engineers (AIChE)** or one of its technological communities including the **Center for Chemical Process Safety (CCPS)** and the **Society for Biological Engineering (SBE)**.

Whichever you choose, your staff members benefit from courses that are:

- **Taught by Seasoned Professionals:** All course instructors are industry veterans with real-world experience to draw on.
- **Developed by Experts:** All courses were developed by established professionals known for their mastery of the material being covered.
- **Priced to Meet Your Budget:** Save when you register multiple staff for AIChE Academy elearning, Public Courses, or In-Company Training. The more staff you train at one time, the deeper your savings.
- **Time- and Travel-Friendly:** Many companies find that In-Company training delivers a number of benefits. They can train more of their staff at one time and place while saving travel time and costs.
- **Customizable for Your Operation** In-Company engagements allow course materials to be customized your company's specific needs.

Contact an AIChE Academy education specialist today for a price quote to see how affordable training your staff can be. Visit [www.aiche.org/incompany](http://www.aiche.org/incompany) to complete a request for a proposal or send an email to [edu@aiiche.org](mailto:edu@aiiche.org) to explore volume pricing for single seats.



## Webinar Bundle

### Process Safety Fundamentals Webinar Bundle

Learn about flammable materials as well as lessons to take away from hazardous incidents. Expand your knowledge of hazard analyses by learning more about material safety data sheets and how industry handles reactive chemical hazards.

This webinar bundle includes:

- Teaching Reactive Chemical Hazards to Chemical Engineers
- Properties of Materials: How Material Safety Data Sheets Help You Perform Hazard Analyses
- An Introduction to Methods of Process Safety Hazard Assessment
- Explosion at T2 Laboratories
- Introduction to Flammable Materials

**Pricing:** AIChE Member Credits - 4  
AIChE Members - \$276.00  
Non-Members - \$396.00

## CCPS' Process Safety Leadership for Front-Line Supervisors



Coming soon  
in Spanish

[www.aiche.org/ela122](http://www.aiche.org/ela122)

Course No.: ELA122

Course Length: 5 Hours

CEUs: 0.5 PDHs: 5.0

AIChE Members and Employees of  
CCPS Member Companies – \$495

Non-Members – \$795



Front-line supervisors have more control and influence over process safety than anyone else in the plant. When they do their job well, everyone works safely. Don't take any chances. In this online course, gain the understanding of process safety concepts (and their execution) that you need to successfully implement your organization's game plan for safety. You'll delve into many of the practices and responsibilities that are traditionally in the hands of front-line supervisors—including operating and maintenance procedures, managing contractors, auditing, and identifying hazards and risks.

### You Will Learn:

- Operating and maintenance procedures
- Work force involvement
- Contractor management
- Hazard identification and risks
- Incident investigation
- Conduct of operations
- Process safety leadership

### Who Should Attend:

Operations and maintenance front-line supervisors responsible for supervising and/or advising unit operators, maintenance crews and contractors.

### Your Instructor:

This course was authored by 12 world-renowned process safety experts.

**For information about your company becoming a member of CCPS, go to [www.aiche.org/ccps](http://www.aiche.org/ccps) and click Join.**

Register online at [www.aiche.org/academy](http://www.aiche.org/academy) or call 1-800-242-4363 (or 1-203-702-7660 outside the U.S.)

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## CCPS' Process Safety Management for Biodiesel



[www.aiche.org/ela100](http://www.aiche.org/ela100)

Course No.: ELA100  
 Course Length: 5 Hours  
 CEUs: 0.5 PDHs: 5.0  
 AIChE Members and Employees of CCPS  
 Member Companies – \$495  
 Non-Members – \$795



OSHA is closely monitoring the biodiesel industry. In this online course, you'll learn how to improve your process safety management and avoid the accidental release of chemicals in your plant. You'll get up to speed on the standards and regulations impacting you as a biodiesel producer. You'll identify the components of a successful process safety program and learn how to implement them — including process hazard analysis, standard operating procedures, safe work practices, mechanical integrity, management of change, auditing process safety systems and emergency response procedures. Throughout the course, you'll tackle and solve a variety of issues and compliance challenges unique to the biodiesel environment.

### You Will Learn:

- Preventing fires in your biodiesel plant
- Understanding methanol toxicity and sodium hydroxide
- Standards and regulations impacting biodiesel producers
- The biodiesel process
- Using foam for biodiesel
- MSDS requirements

### Who Should Attend:

Chemical engineers who work in the biodiesel industry and are responsible for, or involved in, process safety management.

## CCPS' Process Safety Management for Bioethanol



[www.aiche.org/ela124](http://www.aiche.org/ela124)

Course No.: ELA124  
 Course Length: 5 Hours  
 CEUs: 0.5 PDHs: 5.0  
 AIChE Members and Employees of CCPS  
 Member Companies – \$495  
 Non-Members – \$795



Process safety management is one of the most frequently cited hazards at ethanol plants by OSHA. In this online course, you'll learn how to improve your process safety and avoid the unexpected release of toxic, reactive, or flammable liquids or gases in your processes involving highly hazardous chemicals. You'll gain a valuable overview of the standards and regulations impacting you as a bioethanol producer. You'll identify the components of a successful process safety program and learn how to implement them — including process hazard analysis, standard operating procedures, safe work practices, mechanical integrity, management of change, auditing process safety systems and emergency response procedures. Throughout the course, you'll tackle and solve a variety of issues and compliance challenges unique to the bioethanol environment.

### You Will Learn:

- Lessons from the Barton Solvents explosion
- Preventing fires in your ethanol plant
- Understanding the flashpoint of ethanol
- OSHA regulations impacting bioethanol producers
- Protecting your plant from dust explosions
- Staying on top of process safety with written checklists

### Who Should Attend:

Chemical engineers who work in the bioethanol industry and are responsible for, or involved in, process safety management.

Register online at [www.aiche.org/academy](http://www.aiche.org/academy) or call 1-800-242-4363 (or 1-203-702-7660 outside the U.S.)

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## CCPS' Process Safety Management Overview



### [www.aiche.org/els105](http://www.aiche.org/els105)

Course No.: ELS105

Course Length: 10 Hours

CEUs: 1.0 PDHs: 10

AICHE Members and Employees of CCPS Member Companies – \$695

Non-Members – \$995



This online course is an overview of the need for process safety and the tools used to implement process safety management systems. It covers the U.S. OSHA PSM 14 regulatory requirements as well as the Center for Chemical Process Safety (CCPS) 20-element approach to process safety.

Course attendees will learn about the history of accidents leading up to the recognition that process safety technology and education were needed. You will learn about the U.S. OSHA process safety regulatory requirements and the Center for Chemical Process Safety (CCPS) approach to process safety management. You will be instructed in the use of several of the more common process safety management tools.

#### You Will Learn:

- Process Hazard Analysis (PHA)—several of the more common methodologies
- Management of Change (MOC)—perhaps the best way to control hazards
- Mechanical Integrity vs. Reliability—regulatory requirements vs. what you really should do to keep your plant running safely

- Incident investigation—lessons learned and shared
- Layer of Protection Analysis (LOPA)—a system management approach as well as an investigative technique
- Risk estimation

#### Who Should Attend:

Engineers and other technical professionals who play key roles in the management of their organizations' process safety. Those who should attend include PHA team leaders and other professionals who must know how to select and apply various PHA methods.

#### Your Instructor:

Adrian Sepeda

**Please refer to index on p. 60 for all instructor bios.**

Register online at [www.aiche.org/academy](http://www.aiche.org/academy) or call 1-800-242-4363 (or 1-203-702-7660 outside the U.S.)

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## Webinar Archives

### Process Troubleshooting

**Pricing:** AIChE Member Credits - 1  
AIChE Members - \$69.00  
Non-Members - \$99.00

<http://www.aiche.org/process-troubleshooting>



**Not a member of AIChE? For more information about joining AIChE, go to [www.aiche.org](http://www.aiche.org) and click Join.**

## CCPS' Recognizing Catastrophic Incident Warning Signs



[www.aiche.org/ch901](http://www.aiche.org/ch901)

Course No.: CH901

Course Length: 2 Days

CEUs: 1.5 PDHs: 15

Available for In-Company Training; go to [www.aiche.org/incompany](http://www.aiche.org/incompany) for more information



Do you understand why you are having process safety incidents, and what to do to prevent them and minimize their impact? What if you could predict that an incident was going to happen before it does? You can't predict exactly when an incident will occur, but you can practice a higher degree of situational awareness and key in on the incident warning signs that occur before an incident — and then act on the warning signs once you have identified them.

This course will provide guidance and real-world experience on how to recognize catastrophic incident warning signs. Identifying these subtle indicators of weakness in existing business processes and safety programs is an excellent way to drive continued improvement in your process safety program.

### You Will Learn:

- Introduction to incident warning signs
- Leadership & cultural warning signs
- Physical warning signs
- Asset integrity warning signs
- Analyzing risk and managing change warning signs

### Who Should Attend:

Engineers, supervisors, plant managers, operators and technicians who work in the chemical process industries.

### Your Instructor:

Charles Cowley or Louisa Nara

**Please refer to index on p. 60 for all instructor bios.**

Register online at [www.aiche.org/academy](http://www.aiche.org/academy) or call 1-800-242-4363 (or 1-203-702-7660 outside the U.S.)

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## SACHe Certificate Program

The SACHe Certificate Program offers working engineers an easy way to access a selection of knowledge about chemical process safety. Originally developed as a supplement to the undergraduate curriculum, these courses serve as an excellent introduction or refresher in chemical process safety for working professionals.

The program is composed of 9 independent units ranging from broad introductory overview courses to more focused, single-subject units. Each unit can be taken individually, or you can take the entire series and build a serious foundation in process safety.

### Safety in the Chemical Process Industries

Course No.: ELA901

Course Length: 4 Hours PDHs: 4.0



Get a solid introduction to the application of chemical process safety technology in an actual chemical facility. This course covers the concepts of corporate safety programs, laboratory safety inspections, personal protective equipment and process area safety features and procedures. It also covers Design Institute for Emergency Relief Systems (DIERS) methods for characterizing runaway reactions, equipment and methods for characterizing flammable dusts and vapors, and informal and formal safety reviews.

**Your Instructor:** Daniel Crowl

### Runaway Reactions

Course No.: ELA902

Course Length: 4 Hours PDHs: 4.0



Before you can handle chemical reactions safely, you must first understand them. In this course, you'll identify potential runaway reactions and tools for sizing relief systems to safely control and contain them.

**Your Instructor:** Amy Theis

### Risk Assessment

Course No.: ELA903

Course Length: 4 Hours PDHs: 4.0



Explore the latest methods for detecting, preventing and mitigating risks in plants. In this course, you'll learn how methods of risk assessment, management and reduction are related and how to ensure they function together successfully in your operation. You'll learn how to assess the health effects of risks, perform a what-if analysis, and plan and implement a Hazard and Operability (HAZOP) Study. You'll delve into screening analysis techniques, checklist reviews, fault tree and event tree analysis, preliminary hazards analysis and chemical plume and dispersion analysis.

**Your Instructor:** Ralph W. Pike

### Chemical Reactivity Hazards

Course No.: ELA904

Course Length: 4 Hours PDHs: 4.0



Learn how to avoid uncontrolled chemical reactions and the serious harm that they can cause. In this course, you'll gain a basic understanding of chemical reactivity hazards and how to avoid unintended reactions and control intended reactions.

**Your Instructor:** Robert Johnson

### Inherently Safer Design

Course No.: ELA905

Course Length: 4 Hours PDHs: 4.0



Explore inherently safer design of chemical processes and plants, and learn how to avoid hazards rather than control them. In this course, you'll identify the principles for achieving inherently safer processes that have a low level of danger even if things do go wrong.

**Your Instructor:** Dennis C. Hendershot

### Dust Explosion Control

Course No.: ELA906

Course Length: 4 Hours PDHs: 4.0



Dust explosions continue to occur in the chemical industry, killing workers, injuring others, and damaging industrial facilities. The U.S. Chemical Safety Board has made recommendations for preventing dust explosions. In this session, you'll learn what those recommendations are and how they must be applied to minimize and control the hazards related to dust explosions.

**Your Instructor:** Joseph Louvar

### Process Safety 101

Course No.: ELA907

Course Length: 4 Hours PDHs: 4.0



Gain a basic understanding of the U.S. process safety regulations and key concepts related to process safety. In this session, you'll examine process descriptions, process safety management and mechanical integrity. You'll take a look at process controls, flammability and static electricity. You'll also learn about the Design Institute for Emergency Relief Systems (DIERS).

**Your Instructor:** Jon Bernardi

### Process Safety Lessons Taught from Experience

Course No.: ELA908

Course Length: 4 Hours PDHs: 4.0



Examine important case histories related to process safety – including Bhopal, Seveso, examples of tank failures

Register online at [www.aiche.org/academy](http://www.aiche.org/academy) or call 1-800-242-4363 (or 1-203-702-7660 outside the U.S.)

Key to icons: Bestseller Approved Basic Intermediate Advanced eLearning Public In-Company

and T2 – and how to use lessons learned to avoid similar mistakes. This course can be used in safety orientations at industrial facilities.

**Your Instructor:** Ronald Willey

### Basics of Laboratory Safety

Course No.: ELA909

Course Length: 5 Hours PDHs: 5.0



This course provides a complete review of safety for laboratories handling hazardous chemicals. It also covers the safe use of key related lab equipment. While the discussion is aimed at laboratory scale, it introduces wider process safety management concepts such as toxicity and toxic levels, flammability, use of safety data sheets, job safety analysis, bio-safety levels, and fire and explosion prevention. Lab-specific subjects such as inspections, personal protective equipment, hazardous material storage, and waste disposal are also fully covered.

**Your Instructor:** Daniel Crowl

### Nitrogen's Role in Safety

Course No.: ELA910

Course Length: 2 Hours PDHs: 2.0



This course focuses on nitrogen, which is a staple of the chemical industry. Because it is an inert gas, nitrogen is suitable for a wide range of applications covering various aspects of chemical manufacturing, processing, handling, and shipping. Nitrogen is an excellent blanketing that enables the safe storage and use of flammable compounds, and can help prevent combustible dust explosions. It is, however, a significant asphyxiant, and safety principles must be employed in its handling and use.

This two-part lesson will introduce the main safety aspects of nitrogen, first as a safeguard and then as a potential hazard.

### Pricing:

AICHe Undergraduate and Graduate Student Members – FREE

AICHe Members and Employees of CCPS Member Companies – \$129

Non-Members – \$159

Please refer to index on p. 60 for all instructor bios.



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Register online at [www.aiche.org/academy](http://www.aiche.org/academy) or call 1-800-242-4363 (or 1-203-702-7660 outside the U.S.)

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## CCPS' Senior Leaders and Process Safety: The Role and The Opportunity



### [www.aiche.org/ch902](http://www.aiche.org/ch902)

Course No.: CH902

Course Length: Varies

CEUs: Varies PDHs: Varies

Available for In-Company Training; go to [www.aiche.org/incompany](http://www.aiche.org/incompany) for more information



You are an executive or senior manager. Your company has made major investments into process safety systems such as Management of Change, Risk Identification and Mechanical Integrity. It is important to examine the role you personally have in leading the organization to bottom-line process safety results – and the role that each of your reports should have. What are the routine activities where your participation can make a difference? What questions and areas of focus are appropriate for your position?

This interactive course will examine the role that culture plays in catastrophic events, the critical role you have personally in establishing culture, and what good culture for Process Safety looks like.

#### You Will Learn:

- Impacts of process safety failures
- Critical cultural enablers
- Understanding threats to process safety
- The vital systems of prevention
- Assessing the health of organizational process safety and the management toolset
- Emergency preparedness

#### Who Should Attend:

Senior leaders in the petrochemical and petroleum production industries who have accountability for performance of manufacturing/production.

#### Your Instructor:

James Conner

## CCPS' The OSHA Regulatory Approach to Process Safety Management



### [www.aiche.org/ch501](http://www.aiche.org/ch501)

Course No.: CH501

Course Length: 3 Days

CEUs: 2.3 PDHs: 23

Available for In-Company Training; go to [www.aiche.org/incompany](http://www.aiche.org/incompany) for more information



Your responsibility to protect workers and the environment from hazardous chemicals requires thorough knowledge of the latest OSHA and EPA regulatory requirements.

Join process safety and risk management expert Don Abrahamson for an up-to-date look at the OSHA PSM Regulation 29CFR 1910.119 and the EPA Prevention Program process safety regulatory requirements. You'll leave with the knowledge you need to effectively implement, evaluate and audit an OSHA or EPA process safety management program in your organization.

In three days, you'll gain new insight through lectures, discussions and problem-solving sessions.

#### You Will Learn:

- Your regulatory obligations under OSHA PSM Standard 29CFR 1910.119 and EPA Prevention Program 40CFR Chapter 1, Part 68
- Fulfilling PSM regulatory requirements in your workplace: What is needed and expected
- OSHA's 14 key PSM elements
- EPA's Risk Management Program Process Safety Regulation

#### Who Should Attend:

New and experienced front-line engineers responsible for design, maintenance, manufacturing or supervision as well as managers and engineers involved in regulatory compliance.

#### Your Instructor:

Donald Abrahamson

Register online at [www.aiche.org/academy](http://www.aiche.org/academy) or call 1-800-242-4363 (or 1-203-702-7660 outside the U.S.)

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## AIChE's Project Management for Chemical Engineers



[www.aiche.org/ch138](http://www.aiche.org/ch138)

Course No.: CH138  
 Course Length: 2 Days  
 CEUs: 1.5 PDHs: 15  
 AIChE Members – \$1,395  
 Non-Members – \$1,695



In today's global and fast-paced world, the ability to manage complex projects is vital to keep up with industry's demands and needs. Yet many chemical engineers have had no formal training in project management and lack the skills required to bring projects in on time and within budget. Join project management experts Gwenn Carr and Gary Englehardt and gain skills and time-tested and proven templates that will ensure your project is a success.

In two highly interactive days, you'll walk through the key steps of successful project management – including how to initiate, plan, control, monitor, execute and close out projects. Bring your project with you and be ready to fully participate in this course.

### You Will Learn:

- The difference between successful and unsuccessful projects
- The characteristics of effective project leaders
- Common elements of every successful project plan
- Gaining buy-in from stakeholders
- Developing a communication plan

### Who Should Attend:

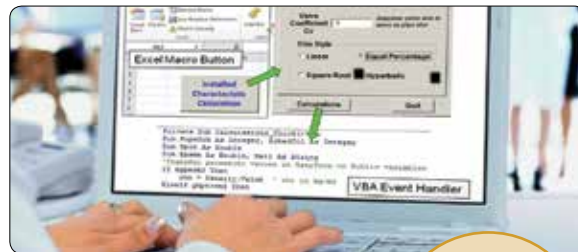
Chemical engineers who face the challenge of managing projects – including:

- New project managers
- Experienced project managers
- Virtual team project managers

### Your Instructors:

Gwenn Carr and Gary Englehardt

## AIChE's Spreadsheet Programming for Chemical Engineers – Excel's VBA



[www.aiche.org/ela118](http://www.aiche.org/ela118)

Course No.: ELA118  
 Course Length: 12 Hours  
 CEUs: 1.2 PDHs: 12  
 AIChE Members – \$695  
 Non-Members – \$995



Also available as  
 a Public Course –  
 see p. 57

If you know your way around Microsoft Excel and you're ready to learn Visual Basic for Applications (VBA) programming, this course is for you. In this online course, chemical engineer and VBA expert David Clough will introduce the built-in programming capabilities of Microsoft Excel and its companion VBA programming language. Learn how to take your spreadsheet problem-solving skills to the next level.

### You Will Learn:

- How to work back and forth between Excel and VBA
- Recording and editing macros
- Debugging VBA code
- Developing Excel add-ins
- VBA programming fundamentals and techniques
- Excel user interfaces: message and input boxes and user forms

### Who Should Attend:

Engineers or scientists who have been working with Excel for some time, have basic spreadsheet skills and basic knowledge of computer programming, or have taken AIChE's Spreadsheet Problem-Solving for Chemical Engineers (ELS101).

### Your Instructor:

Dr. David Clough

Please refer to index on p. 60 for all instructor bios.

Register online at [www.aiche.org/academy](http://www.aiche.org/academy) or call 1-800-242-4363 (or 1-203-702-7660 outside the U.S.)

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## Webinar Archives

### An Engineer's Guide to Using Humor

**Pricing:** AIChE Member Credits - 1  
AIChE Members - \$69.00  
Non-Members - \$99.00

<http://www.aiche.org/humor>

### Critically Thinking About Critical Thinking

**Pricing:** AIChE Member Credits - Free  
AIChE Members - Free  
Non-Members - Free

<http://www.aiche.org/thinking>

## AIChE's Economic Evaluation for Chemical Engineers



[www.aiche.org/ela125](http://www.aiche.org/ela125)

Course No.: ELA125

Course Length: 6 Hours

CEUs: 0.6 PDHs: 6.0

AIChE Members – \$695

Non-Members – \$995



To maximize ROI, every plant-related project must be evaluated for its economic feasibility - a task that can be complex and difficult for a chemical engineer. In this online course, you'll learn how to conduct sound economic evaluations in chemical engineering. The course guides you through a review of the principles of cash-based accounting and delves in-depth into what capital is. It will help you understand evaluation concepts and methods through examples, a class problem and discussion. You'll also consider sensitivities and risk as well as lease-vs-buy analyses and other types of evaluations. The course concludes with a look at overall company performance metrics and variation. Chemical engineers with and without economic evaluation experience will walk away with a deeper understanding of common methods and approaches and how to apply them to both small and large projects.

### You Will Learn:

- To review of cash-based accounting principles
- What capital is, its sources, the Weighted Average Cost of Capital (WACC) and capital budgeting
- The time value of money, discounting and present value
- Recommended evaluation methods and assessment criteria
- How to build evaluation models with a class exercise
- How to analyze the results and assess risk
- Other types of evaluations: Indirect capital, lease-vs-buy
- To perform an analysis of overall company performance and value

### Who Should Attend:

This course will serve as a valuable introduction for new chemical engineers involved in evaluating the economics of capital projects. It also will be a great refresher for experienced engineers who want to deepen their knowledge of methods used to assess projects from plant projects to major strategic investments.

### Your Instructor:

Robert Salvin



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Register online at [www.aiche.org/academy](http://www.aiche.org/academy) or call 1-800-242-4363 (or 1-203-702-7660 outside the U.S.)

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## AIChE's Conceptual Development and Capital Cost Estimating



[www.aiche.org/ch139](http://www.aiche.org/ch139)

Course No.: CH139

Course Length: 2 Days

CEUs: 1.5 PDHs: 15

AIChE Members – \$1,395

Non-Members – \$1,695



To secure the adequate funding of engineering projects in the process industries, you need to accurately identify the project's overall scope and monetary cost. Deficient conceptual estimates can cost you time and money and even threaten the viability of the project. Join project development/cost estimating expert John Williams and gain a thorough grounding in the basics of conceptual development and capital cost estimating.

In two days, you'll learn important estimating terminology and concepts and how to perform the different types of project estimates. You'll examine how to predict and account for equipment costs, installation factors and cost escalation. Plus, you'll delve into the detailed cost estimating process, including methodology and mechanical estimating methods. By the end of the course, you'll have the knowledge and skills necessary to conceptualize projects and develop timely and accurate cost estimates that positively impact all of your engineering projects.

### You Will Learn:

- How to effectively conceptualize projects
- How to perform cost estimating based on project type, size and location
- Applying cost-estimating techniques

*"Overall an interesting and useful course that can be directly applied to my work duties."*

- Dealing with uncertainties and risks inherent in cost estimating
- Understanding the capital cost estimating process

### Who Should Attend:

Professionals involved in conceptualizing engineering projects and developing timely cost estimates. It will be of special value to decision-makers in the process industries – including:

- Plant engineers
- Project engineers
- Project managers
- Plant maintenance personnel
- Engineering managers

### Your Instructor:

John Williams

Register online at [www.aiche.org/academy](http://www.aiche.org/academy) or call 1-800-242-4363 (or 1-203-702-7660 outside the U.S.)

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# AIChE's Project Evaluation: Operating Cost Estimating and Financial Analysis



**SAVE \$895 or more  
when you take CH139  
and CH140 together.**

Just register for course CH758:  
Project Evaluation: Operating  
Cost Estimating Combo Course.  
[www.aiche.org/ch758](http://www.aiche.org/ch758)

[www.aiche.org/ch140](http://www.aiche.org/ch140)

Course No.: CH140

Course Length: 2 Days

CEUs: 1.5 PDHs: 15

AIChE Members – \$1,395

Non-Members – \$1,695



Project evaluation is a critical and highly specialized skill that directly impacts the bottom line. When analyzing any technical or engineering project as a prospective investment, it's vital to make an accurate estimate of operating expenses and return on investment. Join project development expert John Williams as he guides you through the steps the best engineers follow to make sound economic evaluations of projects, designs and alternatives.

In two days, you'll gain a practical framework for evaluating technical and engineering projects and gain a better understanding of the evaluations others make. You'll learn how to accurately estimate operating expenses and calculate return on investment. You'll examine how to conduct a cash flow analysis of financial, operating and investment activities, including how to conduct a discounted cash flow (DCF) analysis to evaluate the attractiveness of an investment and how to use net present value (NPV) and the internal rate of return (IRR) to appraise long-term projects.

## You Will Learn:

- A value-oriented perspective on potential projects
- How to accurately estimate operating expenses
- ROI: How to calculate it

*"Excellent instructor, great knowledge!  
Strong technical background."*

- Key cash flow analysis terms you need to understand – including:
  - Discounted cash flow (DCF)
  - Net present value (NPV)
  - Internal rate of return (IRR)

## Who Should Attend:

Technical managers, R&D personnel, managers, project engineers and project managers involved in projects in the process industries – including:

- Chemical
- Pharmaceutical
- Biological
- Petrochemical
- Materials
- Petroleum
- Gas

## Your Instructor:

John Williams

Register online at [www.aiche.org/academy](http://www.aiche.org/academy) or call 1-800-242-4363 (or 1-203-702-7660 outside the U.S.)

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## AIChE's Spreadsheet Problem-Solving for Chemical Engineers



[www.aiche.org/ch765](http://www.aiche.org/ch765)

Course No.: CH765  
 Course Length: 1 Day  
 CEUs: 0.8 PDHs: 8.0  
 AIChE Members – \$995  
 Non-Members – \$1,295



Spreadsheets are a powerful problem-solving tool for chemical engineers. But to take full advantage of all they can do, you need a strong foundation in common problem-solving spreadsheet techniques. Join chemical engineer and Excel expert David Clough and pick up dozens of tips and techniques, unknown to many engineers, that will help you solve chemical engineering problems faster and more accurately.

In one day, you'll learn how to work with tables of data and calculate flowsheets and material balances. You'll learn how to solve algebraic and differential equations as well as analyze data using methods of applied statistics. You'll also learn how to optimize flowsheet and equipment design, prepare spreadsheets for others to use, and much more.

### You Will Learn:

- Implementing chemical engineering calculations on spreadsheets
- Table-based operations
- Flowsheeting
- Solving equations – single, nonlinear, systems of equations, array functions and matrix calculations
- Creating engineering graphs

*"The instructor was very knowledgeable, and I learned so many cool tricks! I'm definitely glad I registered for this course."*

- Solving differential equations
- The basics of applied statistics, including hypothesis testing, histograms, and linear and nonlinear regression
- Optimization calculations, including cash flow calculations and economic optimization, design optimization, production optimization and linear programming

### Who Should Attend:

Engineers with a basic knowledge of spreadsheets who are involved in any of the following:

- Process engineering
- Plant technical support
- Design and economic evaluation
- R&D
- Education

### Your Instructor:

Dr. David Clough

**Please refer to index on p. 60 for all instructor bios.**

Register online at [www.aiche.org/academy](http://www.aiche.org/academy) or call 1-800-242-4363 (or 1-203-702-7660 outside the U.S.)

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## AICHE's Spreadsheet Programming for Chemical Engineers – Excel's VBA



[www.aiche.org/ch766](http://www.aiche.org/ch766)

Course No.: CH766

Course Length: 1 Day

CEUs: 0.8 PDHs: 8.0

AICHE Members – \$995

Non-Members – \$1,295



If you know your way around Microsoft Excel and you're ready to learn Visual Basic for Applications (VBA) programming, this course is for you. Join chemical engineer and VBA expert David Clough for an intensive, hands-on introduction to the built-in programming capabilities of Microsoft Excel and its companion VBA programming language. Learn how to take your spreadsheet problem-solving skills to the next level.

In one day, you'll learn how to improve your efficiency and enhance your spreadsheets by incorporating VBA. You'll discover how to create time-saving shortcuts via VBA macros and to develop user-defined functions to package custom chemical engineering calculations. You'll also learn how to manage information between the spreadsheet and VBA environments. And, you'll see how to design and implement interfaces including user forms and communication with other software packages, such as process simulators. Throughout the day, you'll cover dozens of topics – everything from creating Excel add-ins to user interfaces – that will improve your Excel problem-solving skills immediately.

### You Will Learn:

- How to work back and forth between Excel and VBA
- Recording and editing macros

**SAVE \$795 or more when you take CH765 and CH766 together.**

Just register for course CH767: Spreadsheet Problem-Solving/VBA Combo Course.  
[www.aiche.org/ch767](http://www.aiche.org/ch767)

- Debugging VBA code
- Developing Excel add-ins
- VBA programming fundamentals and techniques
- Excel user interfaces: message and input boxes and user forms

### Who Should Attend:

Engineers or scientists who have been working with Excel for some time, have basic spreadsheet skills and basic knowledge of computer programming, or have attended AIChE's Spreadsheet Problem-Solving for Chemical Engineers (CH765).

### Your Instructor:

Dr. David Clough

**Please refer to index on p. 60 for all instructor bios.**

Register online at [www.aiche.org/academy](http://www.aiche.org/academy) or call 1-800-242-4363 (or 1-203-702-7660 outside the U.S.)

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## Webinar Bundle

### Job-Changing Skills Webinar Bundle

Learn how to secure your next engineering job and get the tools you need in order to successfully interview, negotiate and thrive in your new position.

This webinar bundle includes:

- Job Search Strategies
- Successful Interviewing Techniques
- Job Derailment vs. Success: Advice for New Engineers
- Negotiating for a New Position
- Job Hunting Strategies
- The First 90 Days: Succeeding in a New Position

**Pricing:** AIChE Member Credits - 5  
AIChE Members - \$345.00  
Non-Members - \$495.00

## Webinar Archives

### Negotiating for a New Position

**Pricing:** AIChE Member Credits - 1  
AIChE Members - \$69.00  
Non-Members - \$99.00

<http://www.aiche.org/negotiate>

### Six Sigma for Chemical Engineers

**Pricing:** AIChE Member Credits - 1  
AIChE Members - \$69.00  
Non-Members - \$99.00

<http://www.aiche.org/sixsigma>

### Spreadsheet Techniques and Problem-Solving for Chemical Engineers

**Pricing:** AIChE Member Credits - 1  
AIChE Members - \$69.00  
Non-Members - \$99.00

<http://www.aiche.org/spreadsheet>

**Not a member of AIChE? For more information about joining AIChE, go to [www.aiche.org](http://www.aiche.org) and click Join.**

## AIChE's Professional Ethics & Excellence for Chemical Engineers



[www.aiche.org/ela127](http://www.aiche.org/ela127)

Course No.: ELA127  
Course Length: 2 Hours  
CEUs: 0.2 PDHs: 2.0  
AIChE Members – \$295  
Non-Members – \$595



As a chemical engineer, your actions affect the health, safety and welfare of society. That makes your ethical conduct as a professional of the utmost importance. In this online course, you'll gain an introduction to key issues in engineering ethics while you prepare to confront and resolve the inevitable ethical dilemmas you'll encounter in your career.

### You Will Learn:

- The basis for codes of engineering ethics and their limitations
- Main principles underlying most codes of engineering ethics
- Understanding ethics in terms of human interactions
- The many needs met through work
- A key principle for handling all human interactions
- Ways to enhance your experience of work—and that of the people around you

### Who Should Attend:

Engineers and managers across all sectors who want to better understand engineering ethics and develop the skills that lead to professional excellence. Whether you're new to engineering or a seasoned veteran, you'll gain insight and tools you can immediately put into practice in your workplace to raise the ethics bar and achieve the highest professional standards in engineering.

### Your Instructor:

Alan Rossiter

**Please refer to index on p. 60 for all instructor bios**

Register online at [www.aiche.org/academy](http://www.aiche.org/academy) or call 1-800-242-4363 (or 1-203-702-7660 outside the U.S.)

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## AICHE's Spreadsheet Problem-Solving for Chemical Engineers



[www.aiche.org/els101](http://www.aiche.org/els101)

Course No.: ELS101  
 Course Length: 30 Hours  
 CEUs: 3.0 PDHs: 30  
 AIChE Members – \$995  
 Non-Members – \$1,295

Also available as  
 a Public Course –  
 see p. 56



Many chemical engineers are self-taught in the use of spreadsheets for day-to-day problem-solving, which is testimony to the inherent usefulness of this tool. Although spreadsheet software was developed for financial calculations, engineers and scientists in all fields have found spreadsheets to be their tool of choice. In this online course, Dr. Clough will provide instruction using Excel 2010 to illustrate a wide range of spreadsheet applications and skills that are relevant to the calculations and problem-solving encountered by practicing chemical engineers.

You will learn how to bring the myriad of features and capabilities of Excel to the challenge of solving problems that you encounter in your work.

### You Will Learn:

- Excel basic skills – improving your efficiency
- Working with tables of data and information
- Process calculations, including flowsheeting and economic analysis
- Applied statistics, including regression analysis
- Solving equations – algebraic and differential
- Programming in Excel using VBA

### Who Should Attend:

Chemical engineers who already have some level of proficiency with Excel and use spreadsheeting as a common software tool for problem-solving. Knowledge of programming in VBA is not required nor expected.

### Your Instructor:

Dr. David Clough

Course content updated

## AICHE's The Three Keys to Managing a Project Successfully



[www.aiche.org/ch137](http://www.aiche.org/ch137)

Course No.: CH137  
 Course Length: 1 Day  
 CEUs: 0.8 PDHs: 8.0  
 Available for In-Company Training; go to  
[www.aiche.org/incompany](http://www.aiche.org/incompany) for more information



Projects come with many moving parts, unknown variables – and landmines. No project manager has a crystal ball to predict and manage the risk ahead. But it may be mitigated. Be ready by mastering the three most important skills that will help you manage and control projects and achieve success. Attend this one-day course and learn how to plan a project, handle risk and manage communications with the stakeholders who need to stay informed.

First, you'll learn how to create a project plan that guides the execution and control of your project. You'll identify the components of a solid plan and the various areas it must cover. You'll then learn how to build a work breakdown structure and use it to organize your project and its diverse tasks. Next, you'll address how to identify potential risks, where they can emerge and how to apply proven risk-management tools to eliminate them early on. The third skill you'll learn is how to build a communication plan and leverage it to identify stakeholders and make sure communication with them is efficient and timely.

Templates will be provided in this course that you can scale for use on your own projects, large and small. Learn-by-doing techniques will be used to introduce and reinforce the skills and techniques you learn.

### You Will Learn:

- How to develop a project plan
- Building a work breakdown structure
- Identifying and managing risks
- Identifying stakeholders
- Creating a communications plan

### Who Should Attend:

- Professionals who manage projects of any size or level of complexity
- Engineers who lead project teams

### Your Instructors:

Gwen Carr, Gary Englehardt or Fred Williams

Register online at [www.aiche.org/academy](http://www.aiche.org/academy) or call 1-800-242-4363 (or 1-203-702-7660 outside the U.S.)

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## ACSP's Product Stewardship



[www.aiche.org/ela136](http://www.aiche.org/ela136)

Course No.: ELA136

Course Length: 7 Hours

CEUs: 0.7 PDHs: 7.0

AIChE Members – \$595

Non-Members – \$895



Gain new insight into the practice of product stewardship from the perspective of chemical product manufacturers.

You'll learn the concepts and principles underlying product stewardship as well as the roles and responsibilities through each stage of the lifecycle. Examine how products are developed, produced and managed to minimize the risks to health and the environment while maximizing value to customers.

Delve into the importance of understanding and engaging all stakeholders, managing product stewardship as a company, and individual roles and responsibilities. Address product life cycle thinking perspectives, risk characterization and risk management, and the necessity of compliance. Define what is "green" and consider how business-to-business interactions influence product stewardship.

While this course is relevant to all products and their life cycles since all products contain chemicals, it is especially valuable to those directly involved as raw material suppliers, manufacturers, users and disposers affected by a product and its associated processes. It is also relevant for those who influence a product's environmental and health risk management.

### You Will Learn:

- Drivers for product stewardship
- Meaning and sources of "risk" and risk perception
- How risk reduction and management can be achieved
- Compliance's role at setting a minimum for product stewardship
- Broad range of potential legal requirements

- How governments try to minimize risk and cost/benefit considerations
- What "green" or "safe" product claims entail and standards for making claims
- The value chain/supply chain in product stewardship
- How business customers influence product stewardship
- Voluntary and not-so-voluntary standards
- Ethical challenges that go beyond compliance
- Components of a product stewardship program for a chemical company using ACC Responsible Care® Product Safety Code
- Challenges for product stewardship

### Who Should Attend:

- Professional product stewards and environmental health and safety specialists
- Researchers
- Process engineers and operations supervisors
- Product managers
- Marketers
- Regulatory and legal specialists
- Purchasers
- Environmental and human health scientists
- Business managers
- Government regulators
- NGOs (non-governmental organizations)

### Your Instructor:

Georjean Adams

Register online at [www.aiche.org/academy](http://www.aiche.org/academy) or call 1-800-242-4363 (or 1-203-702-7660 outside the U.S.)

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## Webinar Bundles

### Carbon & Climate Webinar Bundle

Learn about reducing material and energy consumption as well as reducing carbon dioxide emissions. Review the latest research results regarding air quality implications of shale gas development, and learn to promote technologies to mitigate the consequences of global warming.

This webinar bundle includes:

- Technologies for Carbon Management
- AIChE & A&WMA Web Forum: Air Quality and Greenhouse Gas Implications of Shale Gas Development and Use
- WHODUNNIT? The Mystery of CO<sub>2</sub> Emissions: Is the Flowsheet or Equipment to Blame?
- Climate Change: Engineering R/D Needed!

**Pricing:** AIChE Member Credits - 3  
 AIChE Members - \$207.00  
 Non-Members - \$297.00

### Sustainability from a Systems Approach Webinar Bundle

Sustainability and sustainable development are concepts that affect and are affected by a complex network of interconnected entities and conditions. This set of webinars presents paths and tools critical for truly sustainable design, operations and supply chains. In addition, we offer a glimpse into the operations of the AIChE Institute for Sustainability (IfS).

This webinar bundle includes:

- AIChE & A&WMA Web Forum: Practical Applications of LCA in Industry and Product Design
- Solutions for a Sustainable Tomorrow
- Outcomes of the EPA/NSP/AIChE Sustainable Supply Chain Design Workshop
- Green Design, Green Energy, and Sustainability
- Resilience and Sustainable Development
- The AIChE Sustainable Engineering Forum (SEF) and the Engineers Forum on Sustainability (EFS)
- AIChE YCOSST Activities and an Overview of the Institute for Sustainability (IfS)

**Pricing:** AIChE Member Credits - 3  
 AIChE Members - \$207.00  
 Non-Members - \$297.00



Register online at [www.aiche.org/academy](http://www.aiche.org/academy) or call 1-800-242-4363 (or 1-203-702-7660 outside the U.S.)

Key to icons: Bestseller Approved Basic Intermediate Advanced eLearning Public In-Company

**Donald Abrahamson**

Don Abrahamson has over 40 years of experience in operations and engineering roles to draw from in process safety management, operations management, process safety engineering, technical management, quality assurance management, process development and research. He recently retired from Celanese as their Global Process Safety Manager. He also worked for Occidental Chemical for over 32 years. He has conducted PHAs, audits, incident investigations and/or training on four continents: Americas, Europe and Asia. He has four US Patents from his work in research and development. He holds a BS in Chemical Engineering from Cleveland State University. CCPS projects: Process Safety Boot Camp.

**Georjean L. Adams**

A recognized environmental and health chemical legislative and regulatory expert focused on managing chemical risks with innovative approaches toward sustainability by integrating the needs of the public, government and industry. Significant diverse experience within a multinational manufacturing company, preceded by work at USEPA. Broad experience in development and management of practical EHS systems proven effective across companies, customers and government.

**Jon Bernardi**

Jon Bernardi has a Bachelor of Science degree in chemical engineering from the University of Illinois at Urbana-Champaign and an MBA from Bellarmine University in Louisville, KY. Jon worked for the Lubrizol organization for 36 years in process engineering, project engineering, manufacturing management, quality/safety systems and, most recently, as the process safety manager with global responsibility for manufacturing process safety.

**Todd Brandes**

Todd Brandes is a Principal Engineer with SI Group, serving in the company's Operational Excellence organization.

He has over 20 years' experience in process development, evaluation, design, simulation, and controls, which has included work on a wide range of specialty chemical commercial products such as alkylated phenols, flame retardants, organometallic catalysts, and active pharmaceutical ingredients.

For most of his career, Todd has been involved in all the aspects of the design of pressure relief systems: scenario identification and modeling, valve and disk sizing, two-phase flow, and piping design. In recent years, he has focused on chemically reactive system testing and dynamic simulation of runaway reactions. For many years, Todd has trained coworker engineers at Albemarle Corporation and SI Group on pressure relief design.

Todd graduated from Clemson University with B.S. and Ph.D. degrees in Chemical Engineering. He is a registered professional engineer in South Carolina and a senior member of AIChE.

**Heath Briggs**

Heath J. Briggs is a chemical engineer and a registered patent attorney with more than 10 years of patent prosecution

experience. Heath has significant patent prosecution experience in the chemical area, especially in the areas of material science (e.g., metallurgy) and organic chemistry. He represents several Fortune 500 companies in this area, managing their worldwide patent portfolios. Since 2005, Heath has served as an Adjunct Professor at the University of Colorado Boulder, where he teaches engineering students a self-designed course on intellectual property law. Heath is involved in the community, where his passion is to educate aspiring inventors and entrepreneurs about intellectual property.

**Gwenn Carr**

Gwenn Carr, a Project Management Professional (PMP®), has been a project manager, consultant and educator for over 25 years. She has worked with many companies in various industries and is the co-author of chapters in the *Field Guide to Project Management*. Her interest in improving the skills of project teams grew from her frustration while working with teams who had been assigned to projects and had received no training or guidance. A kinesthetic learner, Ms. Carr uses "learn by doing" techniques in her seminars and workshops to introduce and reinforce project management techniques and skills.

**William Ciolek**

William Ciolek is a Principal Design Engineer with UOP, a Honeywell Company, where he is the lead specialist for pressure relief worldwide. For 30 years, he has consulted on the gamut of pressure relief problems and related process safety elements. Bill has trained hundreds of engineers at UOP and Amoco Corporation on pressure relief design. He served as chairman of the DIERS Users Group subcommittee on incidents and case histories, and he is a current member of the API Subcommittee on Pressure-Relieving Systems. A graduate of Michigan State University, he specializes in development of relief analysis methods.

**Dr. David Clough**

Dr. David Clough has been teaching spreadsheets to undergraduate chemical engineers for 40 years as a professor in the Department of Chemical and Biological Engineering at the University of Colorado. Professor Clough's research is in applied process control. He also served as Associate Dean of Engineering at Colorado for seven years, and he currently represents Colorado to the NCAA as the campus's Faculty Athletics Representative. Dr. Clough has taught over 130 AIChE short courses on spreadsheet problem-solving and programming for ChEs since 1989.

**James Conner**

Jim Conner joined CCPS as a Staff Consultant in 2011. He has 35 years of experience in chemical process engineering, chemical manufacturing operations, and R&D across operations in Asia, Europe, Middle East, and North America. Most recently, Jim held the position of Sr. Vice President, Operations, for Enekem, a solid waste-to-chemicals startup venture. Prior to Enekem, he served as Vice President, Operations and Technology, for Celanese, with responsibility for domestic and international operations and R&D facilities. He was also accountable for the design and startup of a world-scale greenfield plant in China. His career has included management positions in plant oper-



ations, process safety, process engineering and process control in both chemical manufacturing and the manufacture of synthetic fibers. He has expertise in chemical plant management, process optimization and control, management of process and control, management of process safety, incident investigation, conduct of operations, and organizational change management. Jim has both a BS in Chemical Engineering and a Masters in Environmental Engineering from Rice University in Houston, TX.

### Charles Cowley

Charles Cowley is a Mechanical Engineer with 34 years in Oil Industry including 27 years with Shell. Career accomplishments include: project team leader developing Shell HSSE Control Framework, Shell Downstream 'Hearts & Minds' safety culture program leader, primary author of Shell guide 'Competence Assurance of HSSE Critical Positions', led several major incident investigations, Chief Engineer in Shell Morocco, 15 years in Shell major projects, Upstream and Downstream, and Independent Safety Consultants. In 2012, Charles became a CCPS Process Safety Consultant.

### Daniel Crowl

Dr. Daniel A. Crowl is retired from Michigan Tech University and is the past Herbert H. Dow Professor for Chemical Process Safety in the Department of Chemical Engineering. Professor Crowl received his B.S. in fuel science from The Pennsylvania State University and his M.S. and Ph.D. in chemical engineering from the University of Illinois. He is co-author of the textbook *Chemical Process Safety: Fundamentals with Applications*, 1st through 3rd editions, and author of the books *Guidelines for Consequence Analysis of Chemical Releases* and *Understanding Explosions*. He was the executive producer of the eLearning certificate "Chemical Process Safety in the Chemical Process Industries." He is editor of the safety section in the 7th edition, and in the upcoming 8th edition, of *Perry's Chemical Engineers' Handbook*.

Professor Crowl is a member of the AIChE Loss Prevention Committee, past chair of the AIChE Loss Prevention Symposium, and past president of the Safety and Health Division of AIChE. He serves on the AIChE Safety and Chemical Engineering Education (SACHE) committee and the CCPS Technical Steering Committee. Professor Crowl is a Fellow of AIChE, ACS and CCPS and is a Certified Process Safety Professional (CPSP).

### Robert D'Alessandro

Robert D'Alessandro has over 35 years of experience in chemical engineering as a department manager, project manager, process engineer, and technology specialist. He recently retired from Evonik Corporation after more than twenty-three years of service in various positions. In his last position at Evonik, he served as the Director of the Process Technology Department, where he led a team of more than 40 engineers and technicians in providing process engineering services in both North America and South America to improve existing process plants and to design new process plants. Robert has been an active member of the AIChE Design Institute for Emergency Relief Systems (DIERS) Users Group since its inception in 1986. Robert received his BS in Chemistry and Mathematics from Fordham Univer-

sity in 1976, his BS in Chemical Engineering from Columbia University in 1978, and his MS in Chemical Engineering from Manhattan College in 1981. He is a Registered Professional Engineer in the State of Alabama and a Fellow of the American Institute of Chemical Engineers (AIChE).

### Dilip K. Das

Dilip K. Das, P.E., is a Principal Engineer at Bayer Crop-Science's Kansas City Plant. He is a specialist in DIERS (Design Institute for Emergency Relief Systems) technology with over 45 years of diversified experience in process design and process safety. He is the co-author of three books on preparation for FE and PE in Chemical Engineering, a contributing author in Symposium on Runaway Reactions and the upcoming second edition of Guidelines for Pressure Relief and Effluent Handling Systems, author of numerous technical articles, and a holder of US patent. He has double Honors in Chemistry and Chemical Engineering from Pakistan & India respectively having placed first in both and earning gold medals for excellence in Chemical Engineering. He earned an MSChE from University of Washington and a certificate in Expert System in Process Engineering from MIT. He is a Fellow of AIChE and a PE in MO.

### Umesh Dhake

Umesh Dhake, Asia Pacific Regional Manager for Center for Chemical Process Safety (CCPS) is a Chemical engineer with more than 15 years of experience in Risk Consulting. Previously, Umesh worked with ABS Consulting- Risk Division and Germanischer Lloyds GmbH.

He was involved in Preliminary Hazard Analysis, Consequence Analysis, QRA studies, MAH Bow Ties development, SIL verifications as per IEC 61511, Fit for Purpose Certifications for offshore ageing assets- pipelines and platforms. Umesh is also Lead auditor, Lead Tutor for Quality, Environmental, and Occupational Health & Safety management systems.

### Steve Eason

With over 35 years of industrial experience, Steve Eason recently retired from Honeywell as Corporate Global Process Safety Manager. Steve developed and deployed Honeywell's corporate PSM policies while implementing a comprehensive, global corporate PSM and RMP audit program. Steve previously served as Director of Engineering, Chemicals, and Director of Process Technology UF6 at Honeywell. Before Honeywell, Steve was the Vice President of Process Technology for E&J Gallo Winery, where he led the implementation of chemical engineering principles into winemaking. Steve's 23 years at Air Products and Chemicals included roles in production and process engineering; technical and project management at several US sites; and executive levels, including Global Process Technology Manager for Chemicals. He holds a BS in Chemical Engineering from New Mexico State University (NMSU) and an MS in Chemical Engineering from Lehigh University. Steve is a registered professional engineer in NM, PA, NJ and CA, as well as a Certified Process Safety Auditor.

### Gary Englehardt

Gary Englehardt, a Project Management Professional (PMP®), has been involved in projects for over 30 years as a project engineer and consultant. He has helped numerous

companies in the process industries improve the skills of their teams and obtain better project results. He has co-authored chapters in several respected project management books.

### John Farone

John P. Farone is a consultant to the chemical industry with over 40 years of experience in process separations, process simulation and equipment design. He has unique knowledge of the practical design and operation of trayed and packed distillation towers and their internals.

Previously, he was with The Dow Chemical Company for 36 years, where he specialized in process engineering in distillation and stripping.

He is currently a consultant with Fractionation Research Inc. (FRI) and the Separations Research Program (SRP) at the University of Texas at Austin

### Julian Fasano

Julian is president of Mixer Engineering Company in Troy, OH, and has 40+ years of experience in solving mixing problems in both process and mechanical design. Julian retired in 1965 as Technical Director/Director of Engineering & Development for Chemineer, Inc., where he worked for 34 years. He has authored over 95 technical papers on mixing.

Julian has a BS in Chemical Engineering from the University of Dayton, an MS in Chemical Engineering from Lehigh University, a PhD in Materials Engineering from the University of Dayton, and an MBA from the University of Dayton. He is a registered Professional Engineer in the State of Ohio and is a member of AIChE/ASME, NAMF (North American Mixing Forum), and ASM.

### Walt Frank

Walt Frank, PE, has a BS degree in chemical engineering from Rose-Hulman Institute of Technology. He has over 40 years of experience in the chemical process industries, having held assignments in plant technical support, production supervision, R&D, major capital project design and startup, and process safety consulting.

His career includes 24 years with DuPont and ten years with ABS Consulting. He founded Frank Risk Solutions, Inc., in 1997. Walt's consulting expertise includes process safety management program development, evaluation, and improvement; safety culture and organizational effectiveness evaluation and improvement and explosion hazards evaluation and control, with a particular emphasis on combustible dust fire and explosion hazards.

Walt is a Professional Engineer, licensed in Delaware, and is an AIChE Fellow, CCPS Fellow, and Emeritus Member and Staff Consultant for CCPS. He is also an API-qualified assessor in the API Process Safety Site Assessment Program.

### Alan Gableman

Alan Gableman's long, successful career in flavors, fermentation and specialty chemicals has included assignments in process engineering, manufacturing, research and development, and scale-up. He has worked for industry leaders such as Firmenich, Givaudan, Hercules and Stauffer Chemical Company, where he held positions ranging from Produc-

tion Engineer to Process Science Director. As President of Gabelman Process Solutions, Alan currently provides consulting services in separations and process engineering globally. Alan's expertise includes numerous separation processes and other chemical engineering unit operations, equipment selection, design and sizing, process simulation, P&ID development, and process economics. Alan holds BS, MChE and PhD degrees in chemical engineering from Cornell University, the University of Delaware, and the University of Cincinnati, respectively. He is a licensed Professional Engineer, as well as an adjunct instructor in chemical engineering at the University of Cincinnati. Alan has edited a book on bioprocess flavor production, and he has authored several peer-reviewed scientific papers and a book chapter.

### Dr. Wayne Genck

Dr. Wayne Genck is president of Genck International, a consulting firm specializing in crystallization and precipitation. He has consulted with over 250 companies on a wide range of issues, including the impact of impurities, the effect of additives, scale-up, and more. Dr. Genck has written chapters on crystallization for two industry handbooks as well as numerous articles published in chemical engineering magazines.

### Alexandre Glitz

Alexandre Glitz retired from Petrobras, the Brazilian oil company, after 35 years. He has a Civil Engineering degree and a post-grad degree on Safety Engineering from Paraná Federal University (Brazil). His experience includes 25 years in an oil refinery as Safety Engineer, Safety Manager and HSE Coordinator for new projects. At the company's Corporate HSE, he coordinated the implementation of Corporate HSE Guidelines (focus on occupational and process safety) and served as Corporate Safety Manager for 8 years until his retirement.

He worked in the Paraná Fire Department as a fire prevention and design analysis specialist. His experience includes teaching Safety and Risk Management for Safety Engineers post-graduation courses.

### Dr. T. David Griffith

Dr. Griffith received his Bachelor of Science in Chemical Engineering from The University of Texas at Austin, and his Ph.D. from the University of Wisconsin-Madison, then ranked number one in Chemical Engineering. After working in research on enhanced oil recovery (EOR), he and two friends started a small chemical company in Wisconsin specializing in furniture restoration products. Later, his career took a major shift when he developed a record setting electronic data interchange (EDI) software package for his wife's computer software consulting business, and provided support to users as far away as Australia. Now, he is doing what he enjoys most, teaching in the hydrocarbon processing industry.

Besides his background in Chemical Engineering, he was also mentored by one of the most outstanding statisticians in the world who also had a B.S. and M.S. in Chemical Engineering along with an M.S. and Ph.D. in Statistics. Dr. Griffith also has a Green Belt in Six Sigma quality certification.

### Dr. Roger Harrison

Dr. Roger Harrison is one of the first authors (with three co-authors) of the highly acclaimed textbook *Bioseparations Science and Engineering*, which has been adopted by courses at more than 60 universities throughout the world. Before becoming a professor in the University of Oklahoma School of Chemical, Biological and Materials Engineering, he worked at Phillips Petroleum Company and Upjohn, where he focused on bioseparations.

### Dennis C. Hendershot

Dennis C. Hendershot is a chemical engineer with 45 years of experience in process research and development, plant design and startup, and process safety. From 1970 until his retirement in 2005 as a Senior Technical Fellow, he worked at Rohm and Haas Company. He then joined Chilworth Technology Inc. as a Principal Process Safety Specialist (retiring again in 2009) and the Center for Chemical Process Safety (CCPS) of the American Institute of Chemical Engineers as a Staff Consultant. With CCPS, he has worked with the Inherently Safer Design Subcommittee and the Risk Tolerance Criteria Subcommittee, and he serves as editor of the Process Safety Beacon. From 2005–2007, he was a member of the BP North American Refineries Independent Safety Panel, chaired by former United States Secretary of State James Baker. Dennis received his Bachelor of Science degree from Lehigh University and his Master of Science degree from the University of Pennsylvania.

### John Herber

John Herber joined CCPS in 2009 after a 33-year career with 3M Company that included positions in process and project engineering, production operations and corporate safety. In Corporate Safety Services, John developed programs for improving PSM systems across 3M's global operations, including PSM metrics, Process Hazard Management policy and implementation guidance. As a PSM consultant, John has performed audits, facilitated PHAs and assisted with PSM program development and training. John has a BS in Chemical Engineering from Purdue.

CCPS projects: Process Safety Boot Camp Training Program, Process Safety Beacon and Process Safety Moments.

### Diane Hildebrandt

Diane Hildebrandt is SARCHI Professor of Sustainable Process Engineering and Director of the Centre of Material and Process Synthesis (COMPS) at the University of the Witwatersrand, Johannesburg, South Africa. She obtained her BSc and PhD in Engineering and Chemical Engineering from the University of the Witwatersrand.

Professor Hildebrandt is the first female chemical engineer to have been awarded an 'A' rating by South Africa's National Research Foundation. She and colleague Professor David Glasser were jointly awarded the Bill Neale-May Gold Medal by the South African Institute of Chemical Engineers. This was the first time the award had been made to an academic. She was also a recipient of the Vice Chancellor's Researcher Award, University of the Witwatersrand. Diane was the winner of the 2009 Distinguished Woman Scientist of the Year award (Department of Science and Technology, South Africa) as well as the African Union (AU) Scientific Award.

Professor Hildebrandt is a Fellow of the Royal Society of South Africa and has been elected to the Academy of Sciences and the Academy of Engineering of South Africa.

### Jack Hipple

Jack Hipple is a 30-year veteran of the chemical industry. He was previously responsible for global chemical engineering research at Dow Chemical and its Discovery Research New Ventures program. He also managed chemical material technology projects for the National Center for Manufacturing Sciences, new product development in the protective equipment area at Ansell Edmont, and process scale-up for aerogel materials at Cabot Corporation. He is currently a principal with TRIZ and Engineering Training Services LLC, providing consulting and innovation workshops focusing on TRIZ Inventive Problem Solving and introductory chemical engineering training.

He has been the public and on-site instructor for AIChE's Chemical Engineering Essentials and ASME's Inventive Problem Solving ('TRIZ') courses for 13 years. Jack has served as chair of AIChE's Management Division and recently completed a 3-year term on AIChE's Board of Directors, serving on its Finance and Center for Chemical Process Safety committees. He served as an SME on IRI's Disruptive Innovation task force.

### Joseph W. Holmes

Joseph W. Holmes, Principal Engineer, Research & Software Integration, holds BS and MS degrees in Chemical Engineering from Texas A&M University, College Station, Texas (TX), USA. Holmes brings to this position more than 30 years of software development experience. Prior to focusing on the integration of products obtained via an alliance with Honeywell, he served as the project manager for HTRI Xchanger Suite and its components. He has assisted in the development and updating of several HTRI workshops and is a knowledgeable, experienced HTRI workshop instructor. Before joining HTRI, Holmes worked for Bryan Research and Engineering, Bryan, TX, as a process research and development engineer. Holmes is a member of AIChE and a licensed Professional Engineer (PE) in Texas.

### Karl V. Jacob

Karl V. Jacob is a Fellow in Engineering Sciences at The Dow Chemical Company. He is also founder of the Solids Processing Lab at Dow in Midland, Michigan. For the last three decades, he has worked on a vast array of particle technology problems, with particular expertise in silo/hopper design, powder mechanics, pneumatic conveying, particle engineering and drying.

Karl is a chemical engineering graduate of Case Western Reserve University. He is a former member of the AIChE Board of Directors and a past chair of the Particle Technology Forum.

### Robert Johnson

Mr. Johnson is a Fellow of AIChE and an industry leader in the development and dissemination of risk analysis methods and risk management strategies. Since 1978, Mr. Johnson has helped clients prioritize risk reduction options; develop corporate and plant technical safety programs; identify inherently safer processes; train PHA team leaders; and analyze fire, explosion, and toxic release hazards. Mr.

Johnson teaches AIChE continuing education courses on HAZOP Studies and on Advanced Concepts for Process Hazard Analysis, and he teaches process safety in the Chemical and Biomolecular Engineering Department at The Ohio State University.

Among his many contributions to the loss prevention literature, Mr. Johnson was primary contract author of *Guidelines for Enabling Conditions and Conditional Modifiers in Layer of Protection Analysis* and *Guidelines for Hazard Evaluation Procedures, Third Edition*, as well as two books on chemical reactivity hazards, all published by the AIChE Center for Chemical Process Safety. He is also author of two process safety sections in *Perry's Chemical Engineers' Handbook*.

Mr. Johnson holds BS and MS degrees in chemical engineering from Purdue University. He is president of the Unwin Company consultancy, having previously held Senior Engineer positions with Hercules and DuPont and a Research Leader position at Battelle.

He is past chair of the AIChE Safety & Health Division and serves as a member of the CCPS Safety and Chemical Engineering Education (SACHE) Committee.

### Jerry Jones

Jerry L. Jones, PE, joined CCPS as a staff consultant in 2012. He has over 40 years of experience across many industry sectors, including facilities for oil production and refining, commodity chemicals, specialty chemicals and polymers, pharmaceuticals, and electronics industry materials. He has worked in process development and engineering, plant design, EHS, and process safety functions, and has supported manufacturing operations in over a dozen countries while an employee of Monsanto, SRI International, Raychem, and Genentech/Roche. He has extensive experience with the implementation of risk-based management systems, including those for process safety. He earned BS and ME degrees in chemical engineering from Cornell and an MS in environmental engineering from Stanford. He is a licensed professional engineer in Illinois and California, and he holds a number of safety-related certifications. CCPS projects: Process Safety Boot Camp Training Program, Process Safety in Bioprocess Manufacturing Facilities, and Process Safety in Laboratories and Pilot Plants.

### Brian Kelly

Brian Kelly has been a part-time staff consultant with AIChE's Center for Chemical Process Safety (CCPS) since 2005. He was employed for 35 years with Imperial Oil Enterprises (Exxon) and Syncrude Canada Ltd. Brian has an extensive background in engineering, major capital projects, oil refinery operations and process safety. He has participated in numerous process safety audits and incident investigations in the energy sector, and he has taught courses and consulted on process safety matters worldwide. Brian received his BAsC and MASc degrees in chemical engineering from the University of Ottawa (Canada). In 2010, he received the Chemical Institute of Canada's Process Safety Award for his many years of outstanding service in the process safety field.

His CCPS projects include: Process Safety Boot Camp, Hazard Identification, Recognizing Catastrophic Incident Warning Signs, and Dealing with Aging Process Equipment. Brian resides in Calgary, Alberta.

### Ellen Lenz

Ellen Lenz has over 30 years of experience in the chemical industry. She has held positions in project management, research and development, process safety, and operations during her 22 years at LyondellBasell Industries and 9 years at BASF Corporation.

Ellen has expertise facilitating PHAs, developing process safety standards and guidelines, transferring process safety information across organizations, and conducting EH&S audits.

Ellen received a BS in Chemical Engineering from the University of Maryland and an MBA from the College of William & Mary.

### Joseph Louvar

Dr. Joseph Louvar received his BS from the University of Missouri-Rolla (now Missouri University of Science and Technology), his MS from Carnegie Mellon, and his PhD from Wayne State University, all in Chemical Engineering. Following the award of his MS degree, Dr. Louvar worked as a Process Engineer at Corn Products and as a Development Engineer at Wyandotte Chemicals, until Wyandotte Chemicals became BASF Wyandotte. Dr. Louvar held several important positions within BASF in the areas of Systems Engineering, Process Design, R&D Management, and as Director of a research department with scale-up and small-scale production activities. Dr. Louvar has ten patents, and he is the author or co-author of thirty-five publications, including two books: *Chemical Process Safety: Fundamentals with Applications* and *Health and Environmental Risk Analysis: Fundamentals with Applications*. Dr. Louvar is currently a Research Professor at Wayne State University, teaching courses in safety, risk analysis, process design and the statistical design of experiments. He is a past Chair of AIChE's Undergraduate Education Committee, a past Chair of AIChE's Safety and Health Division, and a Fellow of AIChE. Dr. Louvar has been a member of the Michigan Tech Chemical Engineering Industrial Advisory Board since 1990.

### Uzi Mann

Dr. Uzi Mann is a retired professor of chemical engineering at Texas Tech University. He has taught chemical reactor design at undergraduate and graduate levels for over 30 years, and he received several teaching awards. In academe, he successfully obtained numerous research grants from government agencies (NSF, DOE, USDA) and industry to develop innovative chemical reactor operations. Prior to joining academe, he conducted industrial R&D work for 5 years on improving chemical reactor performances. He holds several patents on chemical reactor configurations. Dr. Mann was invited to write the chapter on chemical reactor technology for the 7th edition of the renowned *Kirk-Othmer Encyclopedia of Chemical Technology*. Dr. Mann continues to serve as a consultant to industry in the area of chemical reaction engineering.

### Eric Maynard

Eric Maynard is the Director of Education and a Senior Consultant with Jenike & Johanson, Inc., which is recognized as the world's leading engineering firm specializing in bulk solids handling technology. Eric received his B.S. in Mechanical Engineering from Villanova University



and his M.S. in Mechanical Engineering from Worcester Polytechnic Institute.

During his 18 years at Jenike & Johanson, he has worked on more than 500 projects designing material handling and pneumatic conveying systems for powders and bulk solids such as cement, coal/coke, limestone, resins, biomass, calcined nuclear waste, foods, and pharmaceuticals. He is the cement industry and crushing technology specialist at Jenike & Johanson, and he has valuable experience with dust explosivity and OSHA's National Emphasis Program (NEP) on Combustible Dust Handling (CPL 03-00-008).

Eric routinely lectures on the storage, flow, and pneumatic conveying of bulk solids for companies and at established industrial-focused conferences (e.g., Powder & Bulk Engineering, Powder & Bulk Solids, and IEEE/PCA Cement). He has published over 30 technical articles on solids flow and pneumatic transport.

### Jack McCavit

Jack McCavit retired from Celanese Chemical Company after 35 years of experience in operations management and practical application of process safety management systems. Jack served as the BP Baker Panel's technical project manager and was a part of the team that monitored BP's implementation of the Baker Panel recommendations. Jack served as the committee chair for CCPS' Guidelines for Risk-Based Process Safety. He graduated from Texas Tech University with a BS in chemical engineering.

### Benjamin McDavid

Benjamin McDavid is a Process Safety Engineer with Ashland Inc. He has 20 years of experience in process safety, process engineering design and operations, and has worked for engineering companies, construction companies, and operating companies. He has performed pressure relief design using DIERS technology since 1997. He has been active with the DIERS Users Group since 2000. He is a professional engineer in the state of West Virginia.

### John Murphy

John Murphy has more than 40 years of experience in chemical manufacturing and process safety, with jobs in the chemical industry, consulting and government. He has retired from the U.S. Chemical Safety and Hazard Investigation Board, where he served as lead investigator. John also retired from Dow Chemical Company, where he was a leader in process safety. He has a BS in Chemical Engineering from Tufts University and an MBA from Central Michigan University. John has special expertise in incident investigation and root cause analysis, reactive chemicals management, and process safety management. John is a Professional Engineer, licensed in the state of Texas, and is an AIChE Fellow, CCPS Fellow and Emeritus Member and Staff Consultant for CCPS.

CCPS projects: Process Safety Boot Camp Training Program, Independent Protection Layers and Initiative Events, Conditional Modifier Project.

### Louisa Nara

Louisa Nara is the Technical Director of the Center for Chemical Process Safety (CCPS) for the American Institute of Chemical Engineers (AIChE). She has over 33 years of

experience in the chemical, petrochemical, pharmaceutical and food industries, and has worked for and with over 65 companies. Louisa joined AIChE/CCPS after 15 years with Bayer, where she held positions of increasing responsibility, including: Manager, Process Safety and Crisis Management; Director of HSE, Security and Emergency Response at Bayer's largest US Manufacturing site; and Director, Risk Management and Compliance, NAFTA. Louisa's roles and responsibilities within CCPS include overseeing the development of projects in the CCPS technical portfolio, developing and enhancing CCPS' educational offerings, developing and deploying new tools, and enhancing value for corporate member sponsors. She holds a BS in Chemical Engineering from West Virginia University, an MS in Environmental Engineering from Villanova University, and is a Certified Compliance and Ethics Professional (CCEP). Louisa was elected to the West Virginia University Chemical Engineering Academy for her outstanding professional accomplishments.

### Dr. Theodore Nelson

Dr. Theodore Nelson is focused on performing pressure relief and flare system (PRFS) evaluations for clients in the petrochemical, chemical and pharmaceutical industries. He has proven experience with conducting incident investigations as well as a demonstrated record of addressing safety solutions. Dr. Nelson also has extensive experience in safety technologies; safety testing; process technology; Design Institute for Emergency Relief Systems (DIERS) methodology; Center for Chemical Process Safety (CCPS) guidelines; process safety management; hazard and operability studies; quantitative risk analysis; and ASME, OSHA, and NFPA guidelines.

Dr. Nelson is a safety consultant for IoMosaic, CBI, Honeywell and Noblis (a nonprofit scientific and engineering company in support of projects with the Department of Defense, DOE and other government agencies). Dr. Nelson is an AIChE Fellow and a former officer and member of the board of directors of his local section.

### Albert Ness

Albert Ness joined CCPS in 2013 as a Process Safety Writer. To this role, he brought 39 years of experience with Rohm and Haas, GE Plastics, The Dow Chemical Company and ABS Consulting, during which he worked as a research and development engineer in plastics, agricultural chemicals and ion-exchange resins, and then, starting in 1989, as a process safety specialist. He was the Secretary/Treasurer and then a Director of the Safety and Health Division of AIChE for 13 years. He was a member of the NFPA 654 technical committee for combustible dusts for eight years, as a representative from Rohm and Haas and then Dow Chemical.

Albert has a BS from the University of Arizona and an MS from the University of Illinois, both in Chemical Engineering.

### Norman Nibber

Dr. Norman Nibber has 30+ years' experience in the energy industries, in process design, process safety, insurance & risk consulting, R&D, industrial training, teaching, and process development. His experience covers a number of industrial sectors, but is primarily focused on heavy and conventional oil production, including SAGD & upgrad-

ers, conventional refining, gas production & processing, straddle and fractionation, LPG, olefins, polyolefins, styrene, polystyrene, vinyl monomer, EDC, ethylene oxide, acetic acid, sodium chlorate, methanol, pulp & paper, chloro-alkali, transportation pipeline (HVP, crude, products, etc.), and offshore rigs.

For the last ten years, Norman has operated his risk control consultancy, servicing Canadian and International Companies in the energy and insurance sectors.

Norman's interests lie in new project support; facility layout & siting; facility inspections; risk modeling and risk engineering; facilitating PHAs, HAZOPs, HAZIDs, SILs, and FTA; explosion & fire modeling; semi-QRA; maximum foreseeable loss estimates; business continuity plans; cold-eye project reviews; construction & PSSR reviews; liability exposure assessment; merger & acquisition due diligence assessments; project decision using risk-based cost-benefit studies; and audits and technical support to legal. Norman earned his graduate and postgraduate degrees in Chemical Engineering (Heat Transfer) from the University of Aston in Birmingham, UK.

### **Dr. Andrés Orlando**

Dr. Andrés Orlando is a project engineer with Jenike & Johanson. Andrés received his B.S. in Mechanical Engineering and Ph.D. in Granular Mechanics from Clarkson University. His graduate studies focused on computational modeling of granular materials flows and comparing numerical models against physical experiments. Prior to joining Jenike & Johanson, he spent a year at the University of Southern California researching the micromechanical behavior of sheared sands. As a project engineer for Jenike & Johanson, he troubleshoots and recommends corrective action for solids flow problems, provides recommendations to avoid solids flow-related problems in new installations, and designs customized bulk solids handling equipment. In addition, Andrés regularly lectures on the flow of solids in bins, hoppers, and chutes.

### **Bilal Patel**

Bilal Patel is a consultant at the Centre of Material and Process Synthesis (COMPS), University of the Witwatersrand, Johannesburg, South Africa. He obtained his BSc and PhD in Chemical Engineering from the University of the Witwatersrand.

He has received numerous awards during his PhD studies, including the NRF Scarce Skills Scholarship and the Mellon Postgraduate Mentoring Programme Scholarship.

His research interest is in the field of process synthesis and integration. He is particularly interested in developing systematic methods and tools to aid in flowsheet synthesis, especially tools that can be implemented in the conceptual phase of the design process. These tools should aid in setting targets for processes in order to ensure that they are designed to be efficient, environmentally friendly and sustainable.

### **W. Roy Penney, Ph.D.**

W. Roy Penney, Ph.D., worked for more than 25 years with leading industrial companies such as Phillips Petroleum, Monsanto, A. E. Staley, and Henkel Corp. The author of more than 40 technical publications, and the creator of numerous computerized mixing equipment design programs,

he is currently a professor of chemical engineering at the University of Arkansas.

### **Ralph W. Pike**

Ralph W. Pike is the Paul M. Horton Professor Emeritus in the Department of Chemical Engineering at Louisiana State University. He received his Ph.D. from Georgia Institute of Technology in 1962. The focus of Dr. Pike's research interests is on fluid dynamics with chemical reactions occurring in the flow. This includes transport processes, chemical and biochemical reactor design, applied mathematics, and biological and ecological systems dynamics. His research interests also extend to the related areas of optimization theory and applications for optimal design of engineering systems, on-line optimization of continuous processes, optimization of chemical production complexes, sustainable development and chemicals from biomass.

### **Herman Purutyan**

Herman Purutyan is the CEO of Jenike & Johanson Inc., a world-renowned engineering consulting firm specializing in the storage, flow and processing of powder and bulk solids. He has been recognized worldwide for his technical ability and experience in the field of storage and flow of solids. He has 20 years of experience designing solids handling systems and troubleshooting handling programs in a wide variety of industries.

### **Rahul Raman**

Rahul Raman graduated from Carnegie Mellon University with a Dual Master's Program in Chemical Engineering and Engineering & Technology Innovation Management in 2012. He provides PSM consulting services to the oil and gas industry in Process Safety Information and Management of Change. He provides technical stewardship to the organization and is a subject matter expert for pressure relief system. He has actively participated and contributed in Design Institute for Emergency Relief System (DIERS) User Group Meeting and API Sub-Committee for Pressure Relief Systems. He completed his Bachelors of Technology in Chemical Engineering from Anna University in 2007.

### **A. S. Rangwala**

A. S. Rangwala has worked for 35 years in the mechanical design and structural dynamics of compressors and gas turbines in aircraft engines and steam and gas turbines for power plant applications. He has worked at General Electric Company's Steam Turbines Department in Schenectady, NY, and at General Electric Company's Aircraft Engines Group in Cincinnati, OH, and Lynn, MA. He is the author of the book *Control System Trends and Turbo-Machinery Dynamics: Design and Operation*. He is technical director of the Machinery Dynamics Group of the Center for Engineering Technology in Orlando, FL.

### **Frank Renshaw**

Frank Renshaw is a certified safety professional, certified industrial hygienist and EHS consultant, and has 35 years of experience with Dow Advanced Materials (formerly Rohm and Haas Company). He served as EHS Director for Specialty Materials, Corporate Safety Director and Corporate Industrial Hygiene Director for Rohm and Haas. He chaired the company's Code of Safe Manufacturing

Practice Committee, coordinated business-wide initiatives on closed-system chemical operations, and led Major Accident Prevention studies involving coatings, adhesive, and plastics additives processes. He served on new acquisition teams in Europe and Asia and on a plant start-up team for a coatings facility in Russia. He is co-chair of NIOSH's Manufacturing Sector Council and has published work related to the National Prevention through Design Initiative. Frank received his B.S. degree from the University of Iowa, his M.S. degree from the University of Minnesota, and his Ph.D. from the University of Cincinnati.

### **Martin Rhodes**

Martin Rhodes holds a Bachelor's degree in chemical engineering and a PhD in particle technology from Bradford University in the UK. He has industrial experience in chemical and combustion engineering as well as many years' experience as an academic at Bradford and Monash Universities. He has research interests in various aspects of gas fluidization and particle technology, areas in which he has many refereed publications in journals and international conference proceedings. Martin has served on the editorial boards of Powder Technology and KONA and on the advisory board of Advanced Powder Technology. Martin has a keen interest in particle technology education. He has published books and CD-ROMs on laboratory demonstrations and has directed continuing education courses for industry in the UK and Australia. He was co-founder of the Australasian Particle Technology Society. Martin is Professor Emeritus in the Department of Chemical Engineering at Monash University, Australia.

### **Robert Rosen**

Bob is currently a Staff Consultant and Instructor for CCPS. He has over 15 years of experience in chemical production management; five years in project and process engineering management; and 20 years in the safety, health and environment area. From 1997 through 2003, he was the Director of Emergency Response and Issue Management for BASF Corporation in Mount Olive, NJ. Since 2003, Bob has done Occupational Safety, Process Safety and Emergency Response consulting. Prior to 1997, Bob worked for Merck, Polaroid, Story Chemical, and Polysar. Bob received a B.Ch.E in 1966 from Clarkson University. He is a Fellow of the American Institute of Chemical Engineers.

### **Alan Rossiter**

Alan Rossiter is President of Rossiter & Associates, a consulting firm dedicated to helping oil refineries and chemical plants achieve excellence in energy efficiency. In addition to consulting projects for companies such as ExxonMobil, Phillips66, LyondellBasell and Sasol, Alan provides training courses in pinch analysis and energy management. He also runs courses in communication skills, engineering ethics and professional excellence, and was the 2010 Chair of the South Texas Section of AIChE. Dr. Rossiter was born and raised in Rhodesia (now Zimbabwe) and received his B.A., M.Eng. and Ph.D., all in chemical engineering, from the University of Cambridge, England. He has more than 30 years of process engineering and management experience and more than 70 publications, including the books *Waste Minimization Through Process Design* (McGraw-Hill, 1995), *Professional Excellence: Beyond Technical Competence* (AIChE-Wiley, 2008) and, more recently, *Energy Management*

and *Efficiency for the Process Industries* (AIChE-Wiley, 2015).

### **Robert Salvin**

Robert Salvin is a chemical engineer with over 40 years of experience in the chemical industry. He has been associated 35 of those years with LyondellBasell and its predecessor companies, Lyondell and ARCO Chemical. Throughout his career, Salvin has focused primarily on corporate development with responsibility for economic evaluation guidelines and methodology for the company worldwide. He has an MBA in finance with degrees from Drexel University and is the instructor of AIChE's eLearning course "Economic Evaluation for Chemical Engineers" as well as several AIChE Academy Videos.

### **Richard W. Sarnie**

Rich Sarnie is AIChE's Director of CCPS Projects. Rich has over 30 years of risk management & safety experience in the manufacturing, transportation, mining and retail service industries. He has worked for companies such as OxyChem, Friendly's Ice Cream, Engelhard and The Vitamin Shoppe.

Sarnie's unique and innovative approaches to safety, risk management and loss prevention have earned him profiles in National Underwriter magazine, which called him the "Ideal Risk Manager," and Risk and Insurance magazine, which gave him the title "The Zero Zealot."

Rich has been a presenter and keynote speaker on numerous occasions at local, national and international risk management & safety conferences and seminars. His topics have included safety, loss control, captives and creative risk financing techniques.

Rich recently joined AIChE. He has a BS in Chemical Engineering from the University of Lowell, in Massachusetts, as well as an MBA from Western New England College. He is a Professional Engineer (P.E.), a Board-Certified Safety Professional (CSP) and an Associate in Risk Management (ARM).

### **Gary Sawyer**

Gary Sawyer is a process engineer with over 30 years of industry experience, 18 years of which were in process design and evaluation studies for R&D and business functions. He is retired from Lyondell Chemical Company (formerly ARCO Chemical) and previously worked for Union Carbide. He received his M.S. and B.S. in Chemical Engineering from Rensselaer Polytechnic Institute.

### **Adrian Sepeda**

Adrian Sepeda has a broad background that spans over 33 years in the chemical industry. After managing process safety, risk management and accident investigations for Occidental Chemical Corporation's worldwide operations, he retired from OxyChem as the Director of Risk Management in 2002. He then started his own process safety and risk management consulting firm, A. L. Sepeda Consulting Inc. He has serviced national and international clients that include large corporations as well as small businesses. He "retired" again and closed his business in 2013. Adrian now accepts small process safety- and risk management-related projects and teaching requests.

**Dan Smith**

Dan Smith is a Sr. R&D Advisor with Albemarle Corporation, and Manager of Albemarle's Chemical Reactivity and Engineering Fundamentals group. He has extensive experience in process development, process design, process simulation and process evaluation, which has included work on Albemarle commercial products such as alpha olefins, linear alcohols, flame retardants, and organometallic catalysts. For 20 years he has consulted on pressure relief and related process safety issues. Dan trains engineers at Albemarle Corporation on pressure relief design, and has been active with the AIChE Design Institute for Emergency Relief Systems (DIERS) Users Group since 2004. Since he joined Albemarle's Core Technology group in 2003, his focus has been to develop a comprehensive reactive hazard evaluation program for the whole company, and he has been instrumental in establishing several other process safety practices and procedures within Albemarle. Dan graduated from the University of Arkansas with a B.S. degree in Chemical Engineering in 1985.

**Néstor Sposito**

Néstor Sposito joined CCPS in 2011 after 32 years with Dow Argentina. He is actively involved in the leadership of NFPA and the United Nations Environmental Program's APPEL Process. Néstor has BS degrees in Chemistry and Chemical Engineering and an MS in Hygiene and Safety Engineering.

**S. Greg Starks**

S. Greg Starks, Regional Sales Manager for HTRI in the USA and Canada, graduated with a BS in Mechanical Engineering from Texas A&M University, College Station, Texas, USA. While working at the Shuttle Support Thermal Control Systems Analysis Group of Rockwell International, Houston, Texas, he performed thermal analyses for the space shuttle and developed geometry models for the shuttle and space station. From 1994–1999, Starks was employed at HTRI developing calculation engines for their software as well as a quality control database to track program changes. He then moved to Austin, Texas, to work as the Software Engineering Manager for Tanisys Technology, Inc., a supplier of automated test equipment for semiconductor memory technologies. When he rejoined HTRI, Starks was responsible for enhancements to the Xist calculation engine. He now leads sales efforts in the United States and Canada and assists with HTRI's training initiatives.

**Byron Sun**

Byron has over 27 years of experience in the chemical industry, including 9 years as a chemical engineer, 6 years in production management and 12 years as a safety, health and environment professional. Byron worked for China Petrochemical Company (now SINOPEC) for 9 years and for DuPont Company for 15 years. From 2004 through 2012, he was Safety, Health and Environment Manager for DuPont China. In 2012, Byron became a full-time safety consultant and joined CCPS as a staff consultant.

Byron received a diploma from Shanghai Science and Technology University and obtained a Master's degree from Tongji University.

**Amy Theis**

Amy Theis received her B.S.E. from University of Iowa and is a registered P.E. in the state of Illinois. She has been employed by Fauske for 16 years and currently serves as their Director of Risk Management Services. Areas of expertise include hazard identification for reactive chemical systems, flammability hazards and combustible dust. Amy has performed training worldwide for calorimetry test design and operation, emergency relief system design and preventive and protective strategies for managing combustible dust hazards. She is an active participant in CCPS and is currently serving as the First Vice-Chair for the Safety & Health Division of AIChE.

**Remi Trottier**

Remi Trottier is a research scientist in solids processing at The Dow Chemical Company. He has more than 20 years of industrial experience in particle characterization. He has written numerous papers on particle characterization and has taught short courses.

**Thomas Troxel**

Thomas Troxel is a Vice President at Jenike & Johanson Inc., a world-renowned engineering consulting firm specializing in the storage, flow and processing of powder and bulk solids. He has been involved in many projects related to flow properties testing, modeling, blending, pneumatic conveying and fluidization.

**Dr. Erdem Ural**

Dr. Erdem Ural is a well-known combustible dust expert with over 25 years of experience working on research, litigation, insurance, protection, testing and regulatory aspects of combustible dust problems. He has published numerous papers on the subject and is author of the Explosion Prevention and Protection chapter of the National Fire Protection Association (NFPA) Handbook of Fire Protection. Dr. Ural taught as an Adjunct professor of Fire Protection Engineering at the Worcester Polytechnic Institute. He currently serves on the editorial boards of two technical journals, several NFPA combustible dust hazard committees, and chairs the ASTM International committee responsible for combustible dust hazard standards.

**Christiano Wilbowo**

Christiano Wilbowo has nearly 10 years of experience managing project-related crystallization development and SLE separation processes. He is a principal engineer at ClearWaterBay Technology, Inc.

**Ronald Willey**

Ronald J. Willey, PhD, PE, is a full professor on the faculty of the Department of Chemical Engineering at Northeastern University in Boston, MA. He holds a graduate degree in chemical engineering from the University of Massachusetts, Amherst, (1984) and a BS in chemical engineering from the University of New Hampshire (1974).

Ron is the editor of *Process Safety Progress* magazine. He has authored over 90 technical papers and 10 SACHE products, including a recent case history about chemical



transportation. He has served as the Chairman of the Boston Section of AIChE. He is a Fellow, as well as a Lifetime Member, of AIChE.

He is a registered Professional Engineer in the Commonwealth of Massachusetts, and he presently serves on the Board of Registration of Professional Engineers and of Land Surveyors for the Commonwealth.

### **Fred Williams**

Fred Williams, B.S., PE, is a Senior Project Management Consultant with The Pegasus Organization. Mr. Williams is an experienced Project Manager and Professional Engineer with a B.S. in Civil Engineering from the Georgia Institute of Technology. His clients have included chemical and pharmaceutical companies as well as energy and electric and gas utility organizations. Project areas have included work management, engineering, auditing, procedure devel-

opment, supply chain management and process development. He has been an instructor for the Pennsylvania State University's Project Management Certificate Program. Fred's greatest strength is the way in which he provides guidance in applying project management tools and techniques in a non-threatening manner.

### **John Williams**

John Williams, PE, is a practicing engineer in the process industries with over 30 years of experience in project development, cost estimating and financial analysis. His deep experience spans the chemical, metals, refining, biotech and pharmaceutical industries. In his engineering practice, he specializes in conceptualization, technical and economic analysis, process optimization, plant design and plant retrofits.







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