

The 2015 AIChE Academy Catalog

Your definitive source for training and education opportunities
for chemical engineers.

www.aiche.org/academy

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Dear Colleague:

Professionals like you know how valuable the right information is. Sometimes that's a quick refresher on a subject you haven't touched in a while. And sometimes it's adding a new skill to help you solve a technical problem. You'll encounter both in your career, and **there's no better resource** to help you find the information you need, when you need it, **than the AIChE Academy.**

AIChE Academy is your definitive source for chemical engineering training and professional education. It delivers a full array of training resources to chemical engineers and the companies they work for. From process safety to fundamentals, biomanufacturing to solids handling, heat exchangers to project management, AIChE Academy delivers courses, presentations, webinars and videos that help chemical engineers do their jobs better.

Find the training you need in the format that works best for you.

In these pages you will find the courses you need to thrive professionally. Each course has been developed by recognized subject matter experts—experienced professionals who bring real-world operating experience to their lessons.

AIChE Academy offers courses in two formats. For learners comfortable with self-paced learning, eLearning courses deliver high-quality instruction right to your desktop. Learn at your own pace without interrupting your schedule. If more traditional classroom and seminar instruction is your preference, AIChE Academy public courses are offered in cities around the U.S. and in select international locations.

Train a team or find an answer: the AIChE Academy delivers a wide range of training options.

Any AIChE Academy course can also be delivered as an in-company training course. Many companies find that bringing training onsite is the best way to train larger groups simultaneously. And they typically find that doing so saves money. All AIChE Academy courses can be customized to reflect your specific operations. See p. 21 for complete details on how to start your consultation.

These courses are just the beginning of what the AIChE Academy offers. Visit the AIChE Academy website and you'll find webinars, conference presentations and videos on a wide range of chemical engineering subjects. The fully searchable website can be filtered by topic, availability of CEUs and PDHs, delivery method, skill level — even location — to help you find the training and information you need. Visit today at **www.aiche.org/academy**.

Enhance your career today.

Sincerely,



Anne A. Schaeffer
Director, AIChE Academy

P.S. Your satisfaction with AIChE Academy content is 100% guaranteed. If you are not satisfied, we'll refund your money.

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eLearning

SBE/BTEC Biotechnology for Chemical Engineers



www.aiche.org/ela102

Course No.: ELA102

Course Length: 7 Hours

CEUs: 0.7 PDHs: 7

AICHE and SBE Members – \$795

Non-Members – \$995

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.

Here's a Preview of What You'll 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.

SBE/BTEC Biomanufacturing for Chemical Engineers



www.aiche.org/ela103

Course No.: ELA103

Course Length: 7 Hours

CEUs: 0.7 PDHs: 7

AICHE and SBE Members – \$795

Non-Members – \$995

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.

Here's a Preview of What You'll 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.

Please refer to index on p. 48 for all instructor bios

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



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 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.

Here's a Preview of What You'll 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

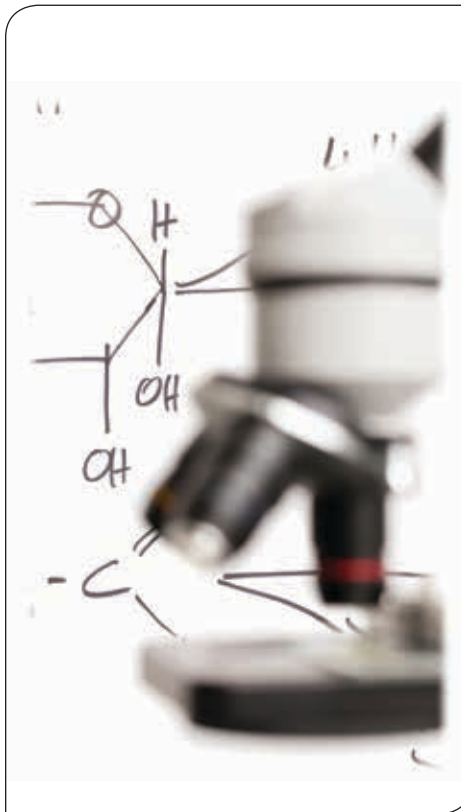
Who Should Attend:

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



AIChE's Chemical Engineering for Non-Chemical Engineers



www.aiche.org/ela110

Course No.: ELA110

Course Length: 30 Hours

CEUs: 3.0 PDHs: 30

AIChE Members – \$795

Non-Members – \$995

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.

Here's a Preview of What You'll Learn:

- The chemical engineering profession and what it covers
- 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

Not a member of AIChE?

For more information about joining AIChE, go to www.aiche.org and click Join.

Please refer to index on p. 48 for all instructor bios

AIChE's Essentials of Chemical Engineering for Operators



www.aiche.org/ela117

Course No.: ELA117
Course Length: 15 Hours
CEUs: 1.5 PDHs: 15
AIChE Members – \$495
Non-Members – \$695

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.

Here's a Preview of What You'll 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

AIChE's Professional Ethics & Excellence for Chemical Engineers



www.aiche.org/ela127

Course No.: ELA127
Course Length: 2 Hours
CEUs: 0.2 PDHs: 2
AIChE Members – \$195
Non-Members – \$395

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.

Here's a Preview of What You'll 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

eLearning

AIChE's Spreadsheet Problem-Solving for Chemical Engineers



www.aiche.org/els101

Course No.: ELS101
Course Length: 30 Hours
CEUs: 3.0 PDHs: 30
AIChE Members – \$895
Non-Members – \$1,095

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.

Here's a Preview of What You'll 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

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



www.aiche.org/ela118

Course No.: ELA118
Course Length: 12 Hours
CEUs: 1.2 PDHs: 12
AIChE Members – \$595
Non-Members – \$795

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.

Here's a Preview of What You'll 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. 48 for all instructor bios

AICHE's Intellectual Property for Chemical Engineers



www.aiche.org/els107

Course No.: ELS107

Course Length: 10 Hours

CEUs: 1.0 PDHs: 10

AICHE Members – \$695

Non-Members – \$895

Engineering is a dynamic and exciting field of work that naturally involves work in chemistry, physics, mathematics, and other basic sciences. But engineering is more than just knowledge of mathematical relationships and chemical formulae. Engineering inherently involves problem-solving, and problem-solving is the seed of innovation that can, and often does, blossom into discovery and invention. This online course will provide the engineer with a basic understanding of the laws that surround the protection of ideas, discoveries, and inventions, including the intellectual property (IP) law principles that surround patents, copyrights, trademarks and trade secrets.

Students enrolling in this course will be exposed to numerous basic patent laws and corresponding strategy, both pre-AIA and post-AIA.

Here's a Preview of What You'll Learn:

- Introduction to intellectual property & patents
- Patents & Utility – Patents & Novelty
- The Patenting Process – Parts 1 & 2
- Copyrights, trade secrets & trademarks

Who Should Attend:

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

Your Instructor:

Heath Briggs



AIChE's Spreadsheet Problem-Solving for Chemical Engineers



Location:
Houston, TX

Date:
June 15, 2015

Location:
Oakland, CA

Date:
October 13, 2015

www.aiche.org/ch765

Course No.: CH765
Course Length: 1 day
CEUs: 0.8 PDHs: 8
AIChE Members – \$895
Non-Members – \$1,095

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.

Here's a Preview of What You'll 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
- 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. 48 for all instructor bios

AICHE's Excel VBA Programming for Chemical Engineers



www.aiche.org/ch766

Course No.: CH766

Course Length: 1 day

CEUs: 0.8 PDHs: 8

AICHE Members – \$895

Non-Members – \$1,095

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.

Here's a Preview of What You'll 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 attended AIChE's Spreadsheet Problem-Solving for Chemical Engineers (CH765).

Your Instructor:

Dr. David Clough

Location:
Houston, TX

Date:
June 16, 2015

Location:
Oakland, CA

Date:
October 14, 2015

SAVE \$495 or more when you take both CH765 and CH766 together.

Just register for course CH767: Spreadsheet Problem-Solving/VBA Combo Course.

Chemical Engineering Essentials

Location:
New York, NY

Date:
June 8 – 10, 2015

Location:
Seattle, WA

Date:
September 28 – 30, 2015

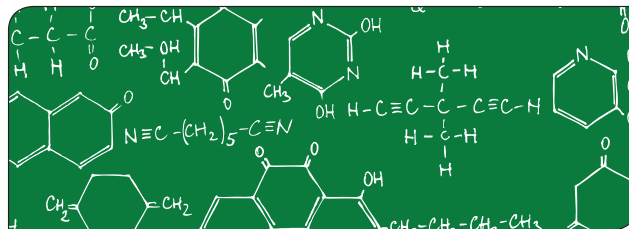
Location:
Atlanta, GA

Date:
December 7 – 9, 2015

Please refer to index on p. 48 for all instructor bios

Instructor-Led Training

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



www.aiche.org/ch710

Course No.: CH710
Course Length: 3 Days
CEUs: 2.3 PDHs: 23
AIChE Members – \$1,695
Non-Members – \$1,895

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 and 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.

Here's a Preview of What You'll 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
- 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
- Breaking down the basics of tank and vessel design
- Essentials of polymerization and polymer processing
- Gain a working knowledge of process control

Who Should Attend:

Non-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

Instructor-Led Training

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



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 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.

Here's a Preview of What You'll 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

AIChE's Control System Techniques in Equipment Design and Operations



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 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.

Here's a Preview of What You'll 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

eLearning

AICHE's Industrial Fluid Mixing for Engineers



www.aiche.org/ela115

Course No.: ELA115
Course Length: 9 Hours
CEUs: 0.9 PDHs: 9
AICHE Members – \$495
Non-Members – \$695

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.

Here's a Preview of What You'll Learn:

- The fundamentals of mixing
- A comparison of the performance characteristics of fluid foil impellers vs. traditionally designed models
- How to apply Laser Doppler Velocity (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 Fluid Mixing Technology for Operators



www.aiche.org/ela116

Course No.: ELA116
Course Length: 8 Hours
CEUs: 0.8 PDHs: 8
AICHE Members – \$495
Non-Members – \$695

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.

Here's a Preview of What You'll 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. 48 for all instructor bios

AIChE's Industrial Fluid Mixing



www.aiche.org/ch090

Course No.: CH090

Course Length: 2 Days

CEUs: 1.5 PDHs: 15

Available for In-Company Training; go to www.aiche.org/incompany for more information

Given the vital role industrial fluid mixing plays in the success of so many products, it pays to stay on top of the most recent developments in the field, including the newest equipment and emerging design concepts. Join Julian Fasano as he brings you up to date on improvements in these areas that lead to greater efficiency, cost savings and a more robust bottom line.

This broad survey course covers the key factors influencing the success of industrial fluid mixing and highlights leading-edge trends and developments.

Here's a Preview of What You'll Learn:

- An overview of the fluid mechanics of impeller flow and shear rate
- The scale-up principles underlying micro-scale and macro-scale mixing
- Blending high- and low-viscosity materials
- The latest developments in:
 - Heat transfer forced convection
 - Helical coils
 - Jacket and vertical tube coefficients
 - Gas-liquid and solid-liquid processes mass transfer design methods
 - Solids suspension

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:

Julian Fasano

AIChE's Heat Exchanger Design and Operations



www.aiche.org/ch294

Course No.: CH294

Course Length: 2 Days

CEUs: 1.5 PDHs: 15

AIChE Members – \$1,295

Non-Members – \$1,495

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.

Here's a Preview of What You'll Learn:

- The critical aspects of heat exchanger design
- A look at 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 Instructors:

Joseph W. Holmes or S. Greg Starks

Course No.: CH294

Location:
Chicago, IL

Date:
June 8 – 9, 2015

Location:
New Orleans, LA

Date:
October 6 – 7, 2015

Location:
New Orleans, LA

Date:
June 1 – 2, 2015

Location:
Salt Lake City, UT

Date:
September 28 – 29,
2015

Instructor-Led Training

AICHE's Conceptual Development and Capital Cost Estimating



www.aiche.org/ch139

Course No.: CH139
Course Length: 2 days
CEUs: 1.5 PDHs: 15
AICHE Members – \$1,295
Non-Members – \$1,495

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.

Here's a Preview of What You'll Learn:

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

Please refer
to index on
p. 48 for all
instructor bios

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



www.aiche.org/ch140

Course No.: CH140

Course Length: 2 days

CEUs: 1.5 PDHs: 15

AIChE Members – \$1,295

Non-Members – \$1,495

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.

Here's a Preview of What You'll Learn:

- Gain a value-oriented perspective of potential projects
- Learn how to accurately estimate operating expenses
- ROI: How to calculate it
- 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

Location:
New Orleans, LA

Date:
June 3 – 4, 2015

Location:
Salt Lake City, UT

Date:
September 30 –
October 1, 2015

SAVE \$595 or more when you take both CH139 and CH140 together.

Just register for course CH758: Project Evaluation: Operating Cost Estimating Combo Course.

Managing Projects

Course No.: CH138

Location:
San Diego, CA

Date:
October 6 – 7, 2015

Course No.: PD513

Location:
Las Vegas, NV

Date: May 4 – 6,
2015

Please refer
to index on
p. 48 for all
instructor bios

Instructor-Led Training

AICHE's Project Management for Chemical Engineers



www.aiche.org/ch138

Course No.: CH138
Course Length: 2 Days
CEUs: 1.5 PDHs: 15
AIChE Members – \$1,295
Non-Members – \$1,495

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.

Here's a Preview of What You'll 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, Gary Englehardt

AICHE/ASME TRIZ: The Theory of Inventive Problem-Solving



www.aiche.org/pd513

Course No.: PD513
Course Length: 3 Days
CEUs: 2.3 PDHs: 23
AIChE Members – \$1,795
Non-Members – \$1,895

Offered jointly by AIChE and ASME. Discover how to solve problems and create new product and business concepts using TRIZ, an inventive problem-solving process. You'll learn how this structured, left-brain approach to breakthrough innovation uses patterns of invention documented in the most innovative of the world's patents. And you'll learn an overall algorithm for use in prediction, forecasting, analysis and planning. You'll receive all course notes, problems and solutions in addition to a copy of the TRIZ 40 Inventive Principles and the book *The Ideal Result: What It Is and How to Achieve It* by Jack Hipple.

Here's a Preview of What You'll Learn:

- Patterns of invention and how to use breakthrough ideas from parallel-universe technology areas
- The basic TRIZ problem-solving algorithm and its basic tools, including Ideal Final Result
- How to use TRIZ for failure prediction and analysis
- Business and organizational problem-solving
- Strategic planning, new product development, and forecasting

Who Should Attend:

- Engineers, scientists, and technical managers focused on innovation and problem-solving
- Professionals interested in adding a breakthrough problem-solving tool to problem definition processes
- Innovation managers interested in improving the quality of inventions and intellectual property

Your Instructor:

Jack Hipple

Instructor-Led Training

AIChE's Six Sigma for Optimization or Problem-Solving in Chemical Processes



www.aiche.org/ch612

Course No.: CH612

Course Length: 3 Days

CEUs: 2.3 PDHs: 23

Available for In-Company Training; go to

www.aiche.org/incompany for more information

Six Sigma is a proven process improvement methodology that is employed by nearly every type of business and industry. This course approaches Six Sigma from the point of view of the practicing chemical engineer. The course is focused on how Six Sigma can be used for the optimization/improvement of chemical processes and related problem-solving.

Take this course and gain a working knowledge of the Six Sigma Define/Measure/Analyze/Improve/Control (DMAIC) problem-solving and process-improvement protocol for existing processes and products that's been tailored for chemical processes and chemical engineers.

Here's a Preview of What You'll Learn:

- Develop an understanding of Six Sigma DMAIC process improvement method, when and why Six Sigma should be used, and how to apply it
- Obtain the knowledge to begin using Six Sigma tools to solve problems and seize opportunities
- Be able to examine and analyze chemical procedures/processes in a structured approach and apply Six Sigma tools to various functions and operations of current processes

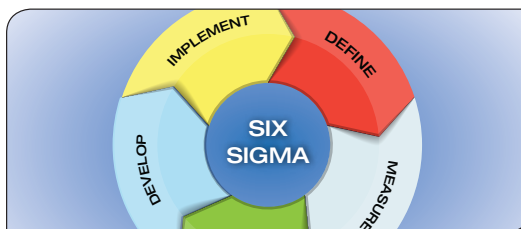
Who Should Attend:

Organizations and individuals that want to practice the Six Sigma methodology without a full-scale implementation of a Six Sigma infrastructure with dedicated staff.

Your Instructor:

Dr. George Liebermann

AIChE's Design for Six Sigma (DfSS) for Development of Chemical Processes



www.aiche.org/ch613

Course No.: CH613

Course Length: 3 Days

CEUs: 2.3 PDHs: 23

Available for In-Company Training; go to

www.aiche.org/incompany for more information

Design for Six Sigma (DfSS) has been developed more recently with the goal of applying the Six Sigma principles to the design of new products and processes.

This course approaches Design for Six Sigma from a Research and Development perspective. It utilizes the point of view of the practicing process research or process development chemical engineer, with special focus on using DfSS in developing new chemical processes or new steps in an existing chemical process. This course provides an overview of the most used DfSS protocols and application of the DMEDI protocol (Define/Measure/Explore/Develop/Implement).

Here's a Preview of What You'll Learn:

- Develop an understanding of DfSS DMEDI methodology to deliver a new process or a new process step
- Obtain the general knowledge and confidence to begin using DfSS/Six Sigma tools
- Be able to develop new processes in a structured approach and to select the appropriate Six Sigma tools to be used

Who Should Attend:

Organizations and individuals that want to practice the DfSS methodology without a full-scale implementation of a Six Sigma infrastructure with dedicated staff.

Your Instructor:

Dr. George Liebermann

AIChE's Integrated Process Synthesis



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 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.

Here's a Preview of What You'll 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



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In-Company Training Details

AIChE In-Company Training delivers results...

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- Peace of mind. Train indispensable staff while keeping them nearby – just in case you need them.

...right to your doorstep:

- Convenient. You set the date and location; AIChE's instructor shows up with all the necessary materials.
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- Create a spirit of teamwork. Learning together is the fastest way to get your team to gel and collaborate.
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- Stay competitive, efficient and profitable. A knowledgeable and skilled staff is your most important sustainable competitive edge.
- Learn the skills and earn the credits. Your employees earn Continuing Education Units (CEUs) and Professional Development Hours (PDHs) upon completion of the training.

Visit www.aiche.org/incompany for more details and to complete a request for a proposal.

eLearning

CCPS' Process Safety Management for Biodiesel



www.aiche.org/ela100

Course No.: ELA100

Course Length: 5 Hours

CEUs: 0.5 PDHs: 5

**AIChE Members and Employees of CCPS
Member Companies – \$395**

Non-Members – \$595

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 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.

Here's a Preview of What You'll 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

Course No.: ELA124

Course Length: 5 Hours

CEUs: 0.5 PDHs: 5

**AIChE Members and Employees of CCPS
Member Companies – \$395**

Non-Members – \$595

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 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.

Here's a Preview of What You'll Learn:

- Lessons to be learned 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.

Please refer to index on p. 48 for all instructor bios

CCPS' Layer of Protection Analysis (LOPA)



www.aiche.org/ela109

Course No.: ELA109

Course Length: 8 Hours

CEUs: 0.8 PDHs: 8

AIChE Members and Employees of CCPS

Member Companies – \$495

Non-Members – \$695

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.

Here's a Preview of What You'll 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
and click Join.

CCPS' 20 Elements of Risk-Based Process Safety



www.aiche.org/ela120

Course No.: ELA120
Course Length: 18 Hours
CEUs: 1.8 PDHs: 18
AICHE Members – \$795
Non-Members – \$995

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 risk
3. Manage risk
4. Learn from experience

Here's a Preview of What You'll 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 and click Join.

Please refer to index on p. 48 for all instructor bios

CCPS' Hazard Identification for Operators and Maintenance Workers



www.aiche.org/ela121

Course No.: ELA121

Course Length: 5 Hours

CEUs: 0.5 PDHs: 5

AICHE Members and Employees of CCPS

Member Companies – \$49

Non-Members – \$69

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.

Here's a Preview of What You'll 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.

CCPS' Process Safety Leadership for Front-Line Supervisors



www.aiche.org/ela122

Course No.: ELA122

Course Length: 5 Hours

CEUs: 0.5 PDHs: 5

AICHE Members and Employees of CCPS

Member Companies – \$395

Non-Members – \$595

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.

Here's a Preview of What You'll 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 Instructors:

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

CCPS' HAZOP Studies



www.aiche.org/els104

Course No.: ELS104

Course Length: 10 Hours

CEUs: 1.0 PDHs: 10

AICHE Members and Employees of CCPS

Member Companies – \$595

Non-Members – \$795

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."

Here's a Preview of What You'll 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. 48 for all instructor bios

CCPS' Process Safety Management Overview



www.aiche.org/els105

Course No.: ELS105

Course Length: 10 Hours

CEUs: 1.0 PDHs: 10

AIChE Members and Employees of CCPS

Member Companies – \$595

Non-Members – \$795

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.

Here's a Preview of What You'll 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:

This course is ideally suited for the new hire engineer, the seasoned engineer newly assigned to process safety projects, or a supervisor needing an overview of what process safety is, why it is needed, and how it should be addressed and implemented. It is also useful to seasoned engineers, supervisors, and managers needing a refresher course to remind them of the fundamentals of process safety. Anyone responsible for communicating process safety information and expectations to the front-line work force would also find this course to be of help and value.

Your Instructor:

Adrian Sepeda

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.

Chemical Process Safety in the Chemical Process Industries

Course No.: ELA901

Course Length: 4 Hours

PDHs: 4

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 of 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: Dan Crowl

Runaway Reactions

Course No.: ELA902

Course Length: 4 Hours

PDHs: 4

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

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

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

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

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

Please refer to index on p. 48 for all instructor bios

those recommendations are and how they must be applied to minimize and control the hazards related to dust explosions.

Your Instructor: Joe Louvar

Process Safety 101
Course No.: ELA907
Course Length: 4 Hours
PDHs: 4

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

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

Basics of Laboratory Safety
Course No.: ELA909
Course Length: 5 Hours
PDHs: 5

This course provides a complete review of safety for laboratories handling hazardous chemicals. It 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 items such as inspections, personal protective equipment, hazardous material storage, and waste disposal are also fully covered.

Your Instructor: Dan Crawl

Pricing:

AIChE Undergraduate and Graduate Student Members: FREE
AIChE Members and Employees of CCPS Member Companies – \$99
Non-Members – \$129

Have 10 or more people to train?

Contact us at edu@aiche.org or 646-495-1383 and ask about our 15% discount.

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



Location:
Chicago, IL

Date:
June 8 – 10, 2015

Location:
Houston, TX

Date:
October 5 – 7,
2015

Location:
New York, NY

Date:
December 7 – 9,
2015

www.aiche.org/ch157

Course No.: CH157
Course Length: 3 Days
CEUs: 2.3 PDHs: 23
AIChE Members and Employees of CCPS
Member Companies – \$1,695
Non-Members – \$1,895

Process Hazard Analysis (PHA) goes beyond merely identifying if 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.

Here's a Preview of What You'll 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

Please refer to index on p. 48 for all instructor bios

CCPS' Advanced Concepts for Process Hazard Analysis



www.aiche.org/ch754

Course No.: CH754

Course Length: 2 Days

CEUs: 1.5 PDHs: 15

**AIChE Members and Employees of CCPS
Member Companies – \$1,295**

Non-Members – \$1,495

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 AIChE's 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), SIL 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 safety integrity levels (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 *Layer of Protection Analysis: Simplified Process Risk Assessment*.

Here's a Preview of What You'll Learn:

- A review of the cause-by-cause HAZOP Study methodology

- 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

Location:
Chicago, IL

Date:
June 11 – 12, 2015

Location:
Houston, TX

Date:
October 8 – 9, 2015

Location:
New York, NY

Date:
December 10 – 11, 2015

**SAVE \$595 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.

AIChE's Advanced Emergency Relief Systems Design Using DIERS Technology

Course No.: CH173

Location:
Philadelphia, PA

Date:
October 20 – 22,
2015



www.aiche.org/ch173

Course No.: CH173

Course Length: 3 Days

CEUs: 2.3 PDHs: 23

AIChE Members – \$1,695

Non-Members – \$1,895

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).

Here's a Preview of What You'll Learn:

- Explore the broad topic of emergency relief system design with an emphasis on DIERS methodology
- Understand how to achieve compliance with established codes, standards and design practices in the broad area of emergency pressure relief and effluent containment
- Obtain knowledge on the application of the DIERS technology for data acquisition and two-phase venting calculations for the severe case of runaway chemical reactions
- Understand available computational models and computer programs through demonstrations and worked examples

- Utilizing real-world scenarios, see how lack of knowledge on basic pressure relief system principles can have fatal consequences
- Obtain resources and references to guide further development as a skilled ERS engineer
- Take 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 system design or evaluation is expected.

Your Instructors:

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

Please refer to index on p. 48 for all instructor bios

CCPS' Managing Process Safety Risks During Organizational Change



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 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

Here's a Preview of What You'll 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 Instructor:

Louisa Nara

CCPS' PROCESS SAFETY BOOT CAMP

www.aiche.org/CH900

Course No.: CH900

Course Length: 4 days

CEUs: 3.2 PDHs: 32

AICHE Members and Employees of CCPS Member Companies – \$1,995

Non-Members – \$2,195

The CCPS Process Safety Boot Camp is an intensive 4-day course which is designed to quickly bring young 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 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 all 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. Taught jointly by process safety veterans with decades of experience at major companies from the process industries, the course is highly interactive.

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.

Here's a Preview of What You'll 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

Interested in taking this course outside of North America? Please register for Foundations of Process Safety course at www.aiche.org/ch910



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

Your Instructors:

Donald Abrahamson	John Murphy
James Conner	Louisa Nara
Dennis C. Hendershot	Albert Ness
John Herber	Frank Renshaw
Jerry Jones	Robert Rosen
Brian Kelly	Néstor Sposito
Ellen Lenz	Byron Sun
Jack McCavit	

For complete bios of the Process Safety Boot Camp instructors, go to p. 48

Locations:

Houston, TX
April 13 – 16, 2015

Seattle, WA
October 5 – 8, 2015

Chicago, IL
June 1 – 4, 2015

Houston, TX
October 26 – 29, 2015

Instructor-Led Training

AICHE's Combustible Dust Hazards: Dust Explosions



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 for more information

Dust hazards and explosions are all too common in the process safety industry. They can lead to property damage and business interruption, as well as injuries and even fatalities. Join combustible dust expert 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 in your plant.

Here's a Preview of What You'll Learn:

- How to spot dust explosion hazards
- 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 of dust hazards and explosions – including:

- Chemical engineers
- Mechanical engineers
- Process engineers/scientists
- Fire protection professionals
- Plant/process safety/risk managers

Your Instructor:

Erdem Ural

CCPS' Hazard Identification for Operations and Maintenance Workers



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 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.

Here's a Preview of What You'll 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

Please refer to index on p. 48 for all instructor bios

Instructor-Led Training

CCPS' Fundamentals of Process Safety



www.aiche.org/ch500

Course No.: CH500

Course Length: 2 Days

CEUs: 1.5 PDHs: 15

Available for In-Company Training; go to www.aiche.org/incompany for more information

As a chemical engineer, your job is to design and manage facilities in such a way as to avoid loss-of-containment incidents resulting in fire, explosion or toxic release. Such incidents can contribute to multiple casualties and can undermine the long-term viability of an operation.

In two interactive days, you'll learn about process hazards as well as physical and human failure modes that have contributed to major process incidents. Gain an understanding of engineering practices related to layout and spacing, system isolation, grading and drainage, relief and blowdown, electrical area classification, fire protection, instrumentation, human factors and facility siting. Throughout the course, you'll examine numerous accident case studies and participate in team breakout exercises.

Here's a Preview of What You'll Learn:

- Accident theory: How and why major incidents occur
- Physical and process hazards: flammability, explosivity and toxicity
- Common equipment failure modes
- Human factors and how they contribute to incidents
- Mechanical integrity and reliability

Who Should Attend:

- Chemical engineers
- Mechanical engineers
- Safety professionals

Your Instructor:

Brian Kelly

CCPS' The OSHA Regulatory Approach to Process Safety Management



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 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.

Here's a Preview of What You'll 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

Instructor-Led Training

CCPS' Inherently Safer Design



www.aiche.org/ch800

Course No.: CH800

Course Length: 1 Day

CEUs: 0.8 PDHs: 8

Available for In-Company Training; go to 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.

Here's a Preview of What You'll 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

CCPS' Incident Investigation



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 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. Examine causal analysis and ways to establish root cause(s).

Here's a Preview of What You'll 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 report 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

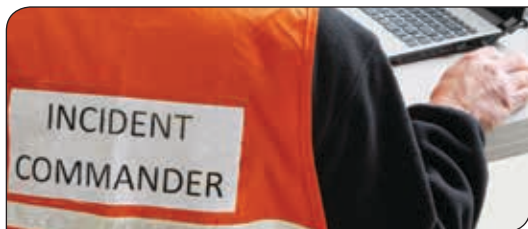
Your Instructor:

Brian Kelly

Please refer to index on p. 48 for all instructor bios

Instructor-Led Training

CCPS' Recognizing Catastrophic Incident Warning Signs



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 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 if 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 experiences on how to recognize catastrophic incident warning signs. Identifying these subtle indicators of weaknesses in existing business processes and safety programs is an excellent way to drive continued improvement in your process safety program.

Here's a Preview of What You'll 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:

Louisa Nara

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



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 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.

Here's a Preview of What You'll 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

AICHE's Distillation in Practice



www.aiche.org/ela112

Course No.: ELA112
Course Length: 20 Hours
CEUs: 2.0 PDHs: 20
AICHE Members – \$895
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.

Here's a Preview of What You'll 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

AICHE's Distillation Technology for Operators



www.aiche.org/ela113

Course No.: ELA113
Course Length: 10 Hours
CEUs: 1.0 PDHs: 10
AICHE Members – \$495
Non-Members – \$695

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.

Here's a Preview of What You'll 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. 48 for all instructor bios

2015 Conferences & Events

AIChE's conferences and meetings are designed to help you stay current on the latest advances in core areas of chemical engineering, while also covering specific topical areas. Specialty conferences cover emerging and related fields—including process safety, bioengineering, sustainability, and alternative energy. For more details and registration information for any of these events, go to www.aiche.org/resources/conferences.

JANUARY

January 11 – 14

5th ICBE—International Conference on Biomolecular Engineering

FEBRUARY

February 9 – 11

2015 AIChE CCPS Asia-Pacific Conference

February 27 – March 1

2015 North Central Student Regional Conference

MARCH

March 1 – 4

4th International Conference on Accelerating Biopharmaceutical Development

March 7 – 8

2015 Northeast Student Regional Conference

APRIL

April 3 – 4

2015 Mid-America Student Regional Conference

April 10 – 11

2015 Mid-Atlantic Student Regional Conference

April 10 – 11

2015 Southern Student Regional Conference

April 17 - 19

2015 Rocky Mountain Student Regional Conference

April 24 – 25

2015 Western Student Regional Conference

April 24 – 26

2015 Southwest Student Regional Conference

April 26 – 30

2015 Spring Meeting and 11th Global Congress on Process Safety

MAY

May 19 – 21

CCPS Middle East Conference on Process Safety

May 26 – 29

ICOSSE 2015

JUNE

June 2 – 4

2015 Process Development Symposium

June 8 – 11

2015 Synthetic Biology: Engineering, Evolution & Design (SEED)

June 28 – July 1

12th International Conference on Gas-Liquid & Gas-Liquid-Solid Reactor Engineering (GLS12)

AUGUST

August 30 – September 3

60th Annual Safety in Ammonia Plants and Related Facilities Symposium

NOVEMBER

November 8 – 13

2015 AIChE Annual Meeting

AIChE's Distillation in Practice

Course No.: CH004

Location:
Chicago, IL

Date:
May 12 – 14, 2015

Location:
Atlanta, GA

Date:
October 6 – 8, 2015



www.aiche.org/ch004

Course No.: CH004
Course Length: 3 Days
CEUs: 2.3 PDHs: 23
AIChE Members – \$1,695
Non-Members – \$1,895

While the basic principles underlying distillation remain unchanged, new hardware, problem-solving and troubleshooting strategies, as well as 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.

Here's a Preview of What You'll Learn:

- Review thermodynamics, vapor-liquid equilibrium, and basic chemical engineering principles
- Learn 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
- 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



Please refer to index on p. 48 for all instructor bios

AICHE's Particle and Bulk Solids Characterization Technology



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 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.

Here's a Preview of What You'll 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 Crystallization Operations



www.aiche.org/ch110

Course No.: CH110

Course Length: 2 Days

CEUs: 1.5 PDHs: 15

AICHE Members – \$1,295

Non-Members – \$1,495

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 explore how to develop methods for scaling up crystallizers and precipitators.

Here's a Preview of What You'll Learn:

- Understanding 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

Course No.: CH110

Location:
Philadelphia, PA

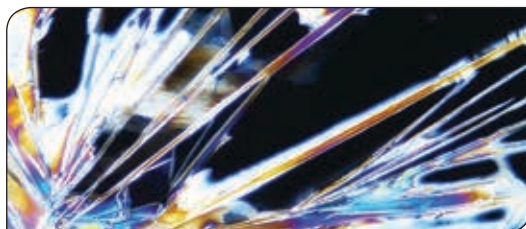
Date:
May 12 – 13, 2015

Location:
New Orleans, LA

Date:
October 20 – 21, 2015

eLearning

AIChE's Crystallization Process Development



www.aiche.org/ela101

Course No.: ELA101
Course Length: 8 Hours
CEUs: 0.8 PDHs: 8
AIChE Members – \$495
Non-Members – \$695

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.

Here's a Preview of What You'll Learn:

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

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

AIChE's Pneumatic Conveying of Bulk Solids



www.aiche.org/ela111

Course No.: ELA111
Course Length: 5 Hours
CEUs: 0.5 PDHs: 5
AIChE Members – \$395
Non-Members – \$595

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.

Here's a Preview of What You'll 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. 48 for all instructor bios

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



www.aiche.org/els102

Course No.: ELS102
Course Length: 10 hours
CEUs: 1.0 PDHs: 10
AIChE Members – \$595
Non-Members – \$795

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.

Here's a Preview of What You'll Learn:

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

Who Should Attend:

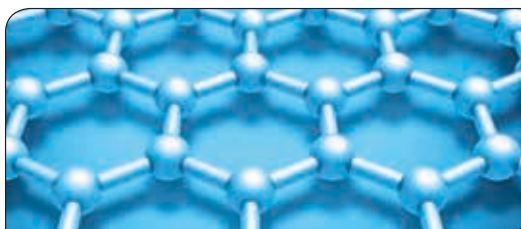
Those involved with designing, troubleshooting, maintaining, or purchasing bulk solids handling equipment:

- 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

AIChE's Particle Technology



www.aiche.org/els106

Course No.: ELS106
Course Length: 20 hours
CEUs: 2.0 PDHs: 20
AIChE Members – \$695
Non-Members – \$895

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).

Here's a Preview of What You'll 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

Solids Handling

Location:
Philadelphia, PA

Date:
September 16 – 17,
2015

Location:
Houston, TX

Date:
December 8 – 9,
2015

Instructor-Led Training

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



www.aiche.org/ch032

Course No.: CH032

Course Length: 2 Days

CEUs: 1.5 PDHs: 15

AIChE Members – \$1,295

Non-Members – \$1,495

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.

Here's a Preview of What You'll 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
- 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 Instructors:

Eric Maynard, Herman Purutyan, Thomas Troxel or Dr. Andres Orlando

Please refer to index on p. 48 for all instructor bios

AIChE's Pneumatic Conveying of Bulk Solids



www.aiche.org/ch033

Course No.: CH033

Course Length: 1 Day

CEUs: 0.8 PDHs: 8

AIChE Members – \$895

Non-Members – \$1,095

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.

Here's a Preview of What You'll 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
- 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 Instructors:

Eric Maynard, Herman Purutyan, Thomas Troxel or Dr. Andres Orlando

SAVE \$495 or more when you take CH032 and CH033 together.

Just register for course CH757: Flow of Solids/Pneumatic Conveying Combo Course.

Location:
Philadelphia, PA

Date:
September 18, 2015

Location:
Houston, TX

Date:
December 10, 2015

Instructor Bios

Donald Abrahamson

Don Abrahamson has over 40 years of experience in operations and engineering roles to draw from, including process safety management, operations management, process safety engineering, technical management, quality assurance management, process development and research. He recently retired from Celanese as the Global Process Safety Manager. He also worked for Occidental Chemical for over 32 years. He has conducted PHAs, audits, incident investigations and/or training in the Americas, Europe and Asia. He has four U.S. 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 Training Program and Process Safety for Front-Line Supervisors. He is a Certified Process Safety Auditor (CPSA).

Scott Berger

Scott Berger, President of Scott Berger and Associates LLC, served as Executive Director of CCPS for 13 years. Scott also worked for 5 years at Owens Corning, where he held a range of Environment, Health, and Safety (EHS) assignments including Director of EHS Strategic Management. In addition, Scott worked for 18 years at Rohm and Haas Company in R&D, engineering, and EHS. Scott also had administrative responsibility for the Design Institute for Physical Properties (DIPPR), and the Design Institute for Emergency Relief (DIERS). Scott received a BS and MS from the Massachusetts Institute of Technology.

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.

Heath Briggs

Heath Briggs is a registered Patent Attorney and has over 10 years of patent prosecution experience in various technical fields. Heath is also an Adjunct Professor at the University of Colorado Boulder, where he teaches Intellectual Property for Engineers.

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.

William Ciolek

William Ciolek is a Principal Design Engineer with UOP, a Honeywell company. 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 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 25 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, from 1986 through 1992, and currently represents Colorado to the NCAA as the campus' Faculty Athletics Representative.

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, the Middle East, and North America. Most recently, Jim held the position of Sr. Vice President, Operations for Enerkem and for a solid waste-to-chemicals startup venture. Prior to Enerkem, he served as Vice President, Operations and Technology for Celanese, with responsibility for domestic and international operations and R&D facilities. He also was accountable for the design and startup of a world-scale Greenfield plant in China. His career has included management positions in plant operations, 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 safety, incident investigation, conduct of operations, and organizational change management. Jim has both a BS Chemical Engineering and Masters Environmental Engineering from Rice University in Houston, TX.

Dan Crowl

Dr. Daniel A. Crowl is the Herbert H. Dow Professor for Chemical Process Safety in the Department of Chemical Engineering at Michigan Technological University. 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 and 2nd editions, published by

Prentice Hall, and author of the books *Guidelines for Consequence Analysis of Chemical Releases* and *Understanding Explosions*, published by AIChE. He was the executive producer of the videotape series "Safety in the Chemical Process Industries." Dr. Crowl also edited (with S. S. Grossel) *The Handbook of Highly Toxic Materials Handling and Management*, published by Marcel Dekker in 1994, *Inherently Safer Chemical Processes - A Life Cycle Approach*, *Layer of Protection Analysis* and *Human Factors Methods for Improving Performance in the Process Industries*, published by AIChE. He contributed a section on vapor dispersion to *Perry's Chemical Engineers Handbook*, 7th ed. and is the editor of the safety section for the 8th edition.

Robert D'Alessandro

Robert D'Alessandro is the Director of the Process Technology Department at Evonik Degussa Corporation, where he has worked since 1991. Robert is a Registered Professional Engineer in the state of Alabama. Work experience includes positions in a technology company, an engineering & construction company, and several operating companies. Robert has been an active member of the DIERS Users Group since its inception in 1986. Since 2004, Robert has served as the elected secretary of the DIERS Users Group. He is also on the editorial board of *Process Safety Progress*, a peer-reviewed journal published by AIChE. Robert is also the author of many publications on emergency relief systems and an active member of AIChE.

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

John Farone

John 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, Troy, OH and has 40+ years of experience in solving mixing problems in for both process and mechanical design problems. 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.

Dr. S. Ganeshan

Dr. S. Ganeshan is a chemical engineer with over three decades of experience in Engineering and Contracting Companies (EPC) in India and abroad. He has served the Chemical, Petrochemical, Fertilizer and Refinery sectors in Process Design, Marketing, and Project Management functions. Dr. Ganeshan has also served as an Adjunct Professor in the Department of Chemical Engineering at IIT Bombay for over 14 years. Presently, Dr. Ganeshan acts as Program Director, Asia-Pacific Region for the Center for Chemical Process Safety (CCPS).

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.

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 for courses at more than 60 universities throughout the world. Before becoming a professor at the University of Oklahoma School of Chemical, Biological and Materials Engineering, he worked at Phillips Petroleum Company and at Upjohn, where he focused on bioseparations.

Dennis C. Hendershot

Dennis C. Hendershot is a chemical engineer with 40 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 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

Instructor Bios

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.

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 has authored or co-authored over 80 scientific papers and has received 306 citations in the past three years. Professor Hildebrandt is the first female chemical engineer to have been awarded an A-rating by South Africa's National Research Foundation. She is also a recipient of the Vice Chancellor's Researcher Award, University of the Witwatersrand. Diane is also 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.

Jack Hipple

Jack Hipple is a 30-year veteran of the chemical industry, including responsibility for global chemical engineering research at Dow Chemical as well as its Discovery Research New Ventures program. He has also managed chemical material technology projects for the National Center for Manufacturing Sciences, new product development for Ansell Edmont in the protective equipment area, and process scale-up for aerogel materials at Cabot Corporation. He is currently a Principal with TRIZ and Engineering Training Services LLC, providing consulting, 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 12 years. He has made numerous presentations for the World Future Society, ASTD and PDMA chapters, and the Altshuler TRIZ Institute. His clients have included Dow Chemical, S. C. Johnson, the U.S. Navy, GM, Siemens, FMC, NCH Corporation, Mosebach Manufacturing, Boeing, Lockheed, Medrad, SABIC Plastics, NSF, and the U.S. Department of Homeland Security. He was the Engineering Week keynoter for Raytheon in 2008. He

was chair of AIChE's Management Division in 2009 and 2010, was elected to AIChE's Board of Directors for the 2012-14 term and is a member of the Finance and CCPS committees of the AIChE BOD. He serves 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, having conducted numerous courses for HTRI members. 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 Jacob 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

Robert 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 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 Jones, PE, joined CCPS as a staff consultant in 2012. He has 40 years of experience across industry sectors including chemicals, polymers, pharmaceuticals, and electronics industry materials. He has worked in process development and engineering, plant design, EHS, and process safety functions and 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 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 35 years of engineering and operations experience and is a consultant with AIChE's Center for Chemical Process Safety (CCPS). He has conducted numerous process safety audits and incident investigations and presented process safety workshops in North America, Europe and Asia. Brian joined CCPS in 2005 as a staff consultant after 35 years of service with Imperial Oil and Syncrude Canada Ltd. Brian received his BASc and MASc degrees in chemical engineering from the University of Ottawa (Canada). Brian has special expertise in Process Safety Management audits in the oil, gas and chemical sectors; process safety training programs; and investigation of significant process incidents. In addition to Brian's many accomplishments, he is the 2010 recipient of the Chemical Institute of Canada's Process Safety Award for his many years of outstanding service to the Process Safety field. CCPS projects: Process Safety Boot Camp Training Program, Recognizing Catastrophic Incident Warning Signs, and Hazard Identification eLearning.

Ellen Lenz

Ellen Lenz has over 30 years of experience in the chemical industry, holding 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 EH&S auditing. Ellen received a BS in Chemical Engineering from the University of Maryland and an MBA from the College of William and Mary.

Dr. George Liebermann

Dr. George Liebermann was Senior Engineering Fellow at the Xerox Research Centre of Canada, where he held various senior scientific and managerial positions beginning in 1981. He retired in 2011 and currently teaches at local universities and does consulting in process scale-up. He is recognized by the international technical community as a chemical engineering process research and scale-up expert, and his work has yielded more than 45 U.S. patents. In 1997, he was presented with the Xerox President's Award, the company's highest honor.

A Fellow of the American Institute of Chemical Engineers (AIChE) and Canadian Academy of Engineering, Dr. Liebermann has also contributed to the profession through involvement with AIChE and the Canadian Society for Chemical Engineering (CSCHE). As a result of his leadership, the AIChE Process Development Division was created. This division has renewed interest in this area, sparked involvement from existing members, and was the catalyst for the participation of several new industry groups.

Dr. Liebermann is a Xerox Lean Six Sigma Black Belt and Design for Six Sigma Black Belt and is currently coordinating the Xerox Innovation Group Six Sigma activities. He also teaches a Six Sigma short course sponsored by AIChE.

Joe Louvar

Dr. Joseph Louvar received his BS from the University of Missouri-Rolla in 1957, his MS degree from Carnegie Mellon in 1961, and his PhD from Wayne State University in 1983; all in Chemical Engineering. Following the award of his MS degree, Dr. Louvar joined Corn Products as a Process Engineer. In 1963, he and his wife Diane managed St. Joseph's Orphanage in Bethany, Oklahoma until he joined Wyandotte Chemicals as a Development Engineer in 1965. In 1969, Wyandotte Chemicals became BASF Wyandotte. Dr. Louvar held several important positions within BASF, including Systems Engineering, Process Design, and 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 and co-author of thirty-five publications, including two books: *Chemical Process Safety: Fundamentals with Applications*, co-authored with Dr. Daniel Crowl, and *Health and Environmental Risk Analysis: Fundamentals with Applications*, co-authored with Diane Louvar. 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 the past Chair of AIChE's Undergraduate Education Committee, the 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.

Instructor Bios

Uzi Mann

Uzi Mann conceived and developed a unifying and dimensionless methodology for designing chemical reactors. He 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 is a professor of chemical engineering at Texas Tech University in Lubbock and an award-winning instructor who has taught chemical reactor design for 20 years.

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 17 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 has valuable experience with dust explosivity and OSHA's National Emphasis Program (NEP) on Combustible Dust Handling (CPL 03-00-008). He 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, IEEE/PCA Cement). He has published 25 technical articles on solids flow and pneumatic transport. Eric is the principal instructor for AIChE/ASME's popular continuing education courses "Flow of Solids in Bins, Hoppers, Feeders, and Chutes" and "Pneumatic Conveying of Bulk Solids." Eric is a member of ASME, AIChE, and NFPA. A graduate of Michigan State University, he specializes in development of relief analysis methods.

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

and construction as well as operating companies. He has been performing 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 The 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 an Emeritus Member and Staff Consultant for CCPS.

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 domestically and internationally. Louisa comes to 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 U.S. manufacturing site; and Director, Risk Management and Compliance, NAFTA. Prior to joining Bayer, Louisa also gained significant experience in process safety, engineering, and HSE with Diamond Shamrock, PQ Corporation, and in private consulting. Louisa's roles and responsibilities within CCPS include: overseeing the execution of projects in the CCPS technical portfolio, developing and enhancing CCPS' educational offerings, developing and deploying new tools, and enhancing value for corporate sponsors. Louisa is a Process Safety Boot Camp instructor and conducts other training and workshops for CCPS. She holds a Bachelor of Science in Chemical Engineering from West Virginia University and a Master of Science in Environmental Engineering from Villanova University, and is a Certified Compliance and Ethics Professional (CCEP). In 2011, 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 is a safety consultant

at IoMosaic, CBI (Shaw Group), Honeywell and Noblis. Dr. Nelson is also a principal at Noblis, a nonprofit scientific and engineering company in support of projects with the Department of Defense, Department of Energy and other government agencies. The work encompasses safety and process technology in developing alternative fuels and supports the elimination of chemical weapons and weapons of mass destruction. He was also a petrochemical planning specialist at Saudi Aramco, Saudi Arabia, where he served as a senior member of the Facilities Planning Department with responsibility to provide direction to Aramco's entry into the petrochemicals field.

Albert Ness

Albert Ness joined CCPS in 2013 as a Process Safety Writer. Prior to that, Albert had 39 years of experience with Rohm and Haas, GE Plastics, The Dow Chemical Company and ABS Consulting 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, as well as 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.

Dr. Andres Orlando

Dr. Andres Orlando is a Project Engineer with Jenike & Johanson. Andres 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 has been involved in troubleshooting and recommending corrective action for solids flow problems, providing recommendations to avoid solid flow-related problems in new installations, and the design of customized handling equipment related to this field.

Bilal Patel

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

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 Co., 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.

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 is the author of *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 and certified industrial hygienist currently serving as an EHS consultant after 35 years with Dow Advanced Materials (formerly the Rohm and Haas Company). He held various positions at Rohm and Haas, including: EHS Director for Specialty Materials, Corporate Safety Director and Corporate Industrial Hygiene Director. He chaired the company's Code of Safe Manufacturing Practice Committee; coordinated a business-wide initiative on closed system chemical operations; and led Major

Instructor Bios

Accident Prevention studies involving acrylic coatings, polyurethane and polyester adhesive processes. He represented the EHS function on new acquisition teams in Europe and Asia, and as a start-up team member for a coatings manufacturing facility in Russia. He serves as co-chair of NIOSH's Manufacturing Sector Council and has published work related to the National Prevention through Design initiative. Frank received his Bachelor of Science degree from the University of Iowa, Master of Science degree from the University of Minnesota, and Doctorate degree from the University of Cincinnati.

Martin Rhodes

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 and 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*.

Robert Rosen

Bob has over 15 years' 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, an industrial process improvement consulting company working primarily in the field of energy efficiency. In addition to consulting projects for companies such as ExxonMobil, ConocoPhillips 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 60 publications, including the books *Waste Minimization through Process Design* (McGraw-Hill, 1995) and *Professional Excellence: Beyond Technical Competence* (AIChE-Wiley, 2008). He also wrote the 'Energy

Management' article in the *Kirk-Othmer Encyclopedia of Chemical Technology, 5th Edition* (John Wiley & Sons, 2005).

Adrian Sepeda

Adrian Sepeda has a broad 33-year background in the chemical industry. After managing process safety, risk management and accident investigations for Occidental Chemical Corporation's worldwide operations, he started his own process safety and risk management consulting firm. He has national and international clients that include large corporations as well as small businesses.

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, USA/Canada at HTRI, 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/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 24 years of experience in the chemical industry, including 9 years as chemical engineer, 6 years in production management and 9 years as a safety, health and environment professional. Byron worked for China Petrochemical Company (now SINOPEC) for 9 years and DuPont for 15 years. From 2004 through 2012, he was Safety, Health and Environment Manager for DuPont China. In 2012, Byron Sun 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 PE in the state of Illinois. She has been employed by Fauske for 11 years and currently serves as the Manager of Chemical Testing & QA Services. Areas of expertise include reactive chemical systems, experimental test design strategy and emergency relief system design. She is an active participant in the DIERS Users Group and SACHE Committee. She currently serves as a Director 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 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.

Erdem Ural

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's (NFPA) *Handbook of Fire Protection*.

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.

Ron 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. His graduate degree is in chemical engineering from the University of Massachusetts, Amherst (1984) and his BS is in chemical engineering from the University of New Hampshire (1974).

He is co-editor of *Process Safety Progress*. 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 for Engineers and Land Surveyors for the Commonwealth.

John Williams

John Williams, PE, is a practicing engineer in the process industries with a 30+ year background 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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