

CERTIFICATE IN

SAFETY INSTRUMENTATION SYSTEMS FOR PROCESS INDUSTRIES

12 MODULES OVER 3 MONTHS

For upcoming commencement dates, please view our course schedule at:
<http://www.eit.edu.au/schedule>

COURSE OBJECTIVES

After completing this course, you will understand:

- Fundamentals of risk assessment and the role of safety regulations
- Principles of risk reduction by safety instrumented systems (SIS)
- The differences between a basic control system and an SIS
- The principles and application of the safety life cycle for project management
- The meaning and implications of safety integrity levels (SILs)
- How to use fault tree analysis to predict accident rates and failure rates
- Process hazard study methods including HAZOP
- How SIL targets are determined
- The roles of standards IEC 61508 and IEC 61511
- The role of alarms in safety critical applications
- Key features of safety certified PLCs
- Methods for avoidance of spurious trips
- How to optimise proof testing intervals
- How to design the SIS to meet IEC requirements for SIL targets
- Understand failure modes and the concepts of fault tolerance
- How to calculate failure probabilities for single and redundant SIS designs
- How to select instruments and controllers suitable for safety systems
- How to manage the application software project for your safety system

Presented by

**Dave
Macdonald**

BSc (Hons) Inst. Eng.



ENROL NOW: Fax the enrolment form to us,
or email enquiries@eit.edu.au

BENEFITS OF LIVE E-LEARNING

- Attend lessons in an online classroom with your instructor and fellow students
- Upgrade your skills and refresh your knowledge without having to take valuable time away from work
- Receive information and materials in small, easy to digest sections
- Learn while you travel - all you need is an Internet connection
- Have constant support from your course instructor and coordinator for the duration of the course
- Interact and network with participants from around the globe and gain valuable insight into international practice
- Learn from international industry experts, based around the globe
- Live interactive webinars, not just a 'book on the web'
- Receive a certificate of completion for CPD purposes

PRESENTATION FORMAT

The certificate program features real-world applications and use a multi-pronged approach involving self-study, interactive on-line webinars and homework assignments with a mentor on call. The course consists of 12 modules, over a period of 3 months.

Some modules may involve a practical component or group activity. For each module there will be an initial reading assignment along with coursework or problems to be handed in and practical exercises in some cases. Participants will have ongoing support from their instructor and course coordinator.

Course reading material will be delivered in electronic (PDF) format in advance of on-line presentations. Presentations and group discussions will be conducted using a live interactive software system. Assignments will be submitted electronically and wherever possible, practical exercises will be conducted using simulation software and remote labs.

LIVE WEBINARS

During the program you will participate in 6 live interactive sessions with the instructor and other participants from around the world. Each webinar will last approximately 60 to 90 minutes, and we take student availability into consideration wherever possible before schedule webinar times. Contact us for details of webinar session scheduling. All you need to participate is an adequate Internet connection, speakers and a microphone. The software package and setup details will be sent to you prior to the course.

PRESENTED BY

DAVE MACDONALD

BSc (Hons) Inst. Eng.



Throughout his career Dave has been involved in the application of instrumentation and control technology to industrial and chemical processes. As a senior instrument engineer in the UK and later with AECI Ltd in South Africa he was involved in managing the design and implementation projects for process control systems from conceptual design to commissioning.

Over the past 6 years Dave has specialised in the technology of risk reduction through the application safety instrumented systems. He has worked as a training instructor and team leader for hazard studies and safety system reviews in chemical processing plants and boiler systems. With IDC Technologies he has developed this course to reflect recent developments in international best practices.

In the past few years, Dave has lectured on this and related topics to hundreds of engineers and technicians in Canada, the United Kingdom, Ireland, Australia and South Africa. His positive and enthusiastic approach combined with his broad knowledge of the subject makes this course a not-to-be missed learning experience.

12 MODULES OVER 3 MONTHS

OVERVIEW:

This course is for engineers and technicians who wish to develop their knowledge of the design and implementation of safety instrumented systems as applied to industrial processes.

Safety control systems are widely used in hazardous processes to protect people, the environment and equipment against serious harm. Many countries look for compliance to international standards IEC 61508 and IEC 61511 as a benchmark of acceptable quality in design and management of safety controls.

This course will explain the key requirements of the IEC 61511 standard for all stages of the safety project from hazard and risk assessment studies through to hardware and software engineering and on to the maintenance and proof testing regimes.

Practical examples and discussions will assist you to develop your skills in this most important aspect of instrument engineering.

Module 1: Overview of Safety Instrumented Systems

Module 2: Safety life cycle models

Module 3: Hazard study methods

Module 4: Risk reduction by SIS

Module 5: SIL determination methods

Module 6: Designing SIS structures

Module 7: Selecting instruments for safety duties

Module 8: Reliability analysis

Module 9: Safety-certified PLCs

Module 10: Application software for safety duties

Module 11: Documentation and management

Module 12: Diagnostics and proof testing

INCLUDES 4 FREE REFERENCE MANUALS

VALUED AT OVER US\$400

YOU WILL RECEIVE 4 OF OUR UP-TO-DATE TECHNICAL E-BOOKS TO ADD TO YOUR LIBRARY.

- Practical Safety Instrumentation Emergency Shutdown Systems
- Practical HAZOPS for Engineers and Technicians
- Practical Intrinsic Safety for Engineers and Technicians
- Practical Hazardous Areas for Engineers and Technicians

Received upon completion.

All materials required for the course will be provided electronically, in smaller, easy-to-read sections.

Please Note: e-Books are available in hard copy at 50% of the recommended retail price. Contact us for pricing details.



COURSE OUTLINE

MODULE 1: Overview of Safety Instrumented Systems

- Safety system basics with an example SIS
- Hazards, risks and risk reduction
- Principles of safety management
- Functional safety standards IEC 61508/61511
- Setting SIL targets
- Designing to meet SIL targets
- Cost of ownership

MODULE 2: Safety Life Cycle Models

- Purpose of life cycle models
- IEC 61511 requirements
- Step by step activities

MODULE 3: Hazard Study Methods

- Hazard studies and project stages
- Hazard identification methods
- HAZOP method
- Developing SIS requirements
- Fault tree analysis

MODULE 4: Risk Reduction by SIS

- Deciding risk targets
- Principle of ALARP and tolerable risk
- Layers of protection and role of alarms
- Risk reduction models
- Preparing a safety requirements specification

MODULE 5: SIL Determination Methods

- Quantitative and risk matrix methods
- Risk graphs
- Layers of protection analysis
- Practical examples

MODULE 6: Designing SIS Structures

- Design procedure steps
- IEC 61511 guidelines
- Architectures and fault tolerance
- Choosing the right structures for the job

MODULE 7: Selecting Instruments for Safety Duties

- Switches versus transmitters
- Failure modes of sensors and actuators
- Minimising dangerous failures
- Qualification by design and certification
- Qualification by prior use
- Smart instruments and diagnostic coverage

MODULE 8: Reliability Analysis

- Purposes of reliability calculations
- SIS failure modes, safe and dangerous
- Formulae and how to use them
- Worked examples
- Obtaining reliability data and the problems
- Review of software tools

MODULE 9: Safety-certified PLCs

- Logic solvers, old and new
- Development of safety PLCs
- Hardware and software features
- Review of industry types
- Communications and networking
- Integrated basic and safety control

MODULE 10: Application Software for Safety Duties

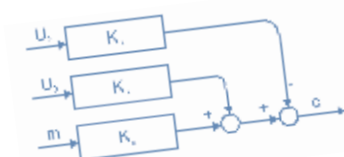
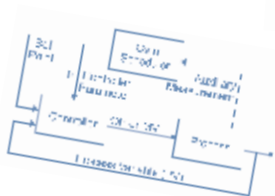
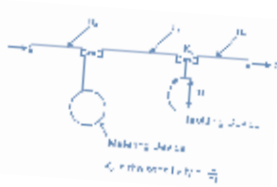
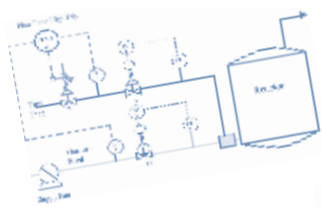
- The problem with software
- IEC software life cycle models
- Application software steps
- Factory acceptance testing
- Quality assurance and certification

MODULE 11: Documentation and Management

- Documents needed for the SIS project
- Verification and validation
- Operations
- Management of change

MODULE 12: Diagnostics and Proof Testing

- Proof testing and why it is needed
- Testing of sensors
- Partial closure testing of valves
- Optimising the proof test interval



HARDWARE AND SOFTWARE REQUIREMENTS

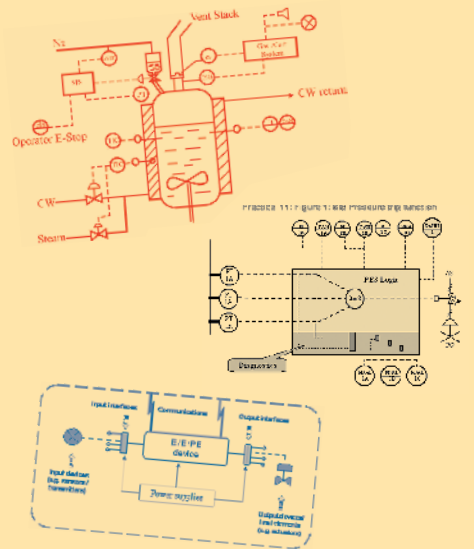
All you need to participate is an adequate Internet connection, PC, speakers and a microphone. The software package and setup details will be sent to you prior to the course.

ENTRANCE REQUIREMENTS

Some practical work experience in some of these topics would obviously be advantageous.

PRACTICAL EXERCISES

Throughout the course you will participate in hands-on exercises using simulation software, which will help you put theory to practice immediately!



CERTIFICATION

Participants completing all the assignments, and achieving 50% or more for their final mark, will receive the Engineering Institute of Technology Certificate in Safety Instrumentation Systems for Process Industries.

