



IICA
Functional Safety
Engineer Training

Safety Instrumented
Systems

2020

TÜV Rheinland
Functional Safety
Program

Connecting Industry

IICA Functional Safety Engineer SIS Training TÜV Rheinland Functional Safety Program

The IICA Functional Safety Engineer SIS training course has been developed by IICA for automation and control professionals and risk engineers in the process industries. IICA is an accepted course provider in the TÜV Rheinland Functional Safety Program and TÜV Rheinland will award qualified participants who pass the exam at the end of the course a Functional Safety Engineer (TÜV Rheinland) certificate.

The course is based on the latest edition of IEC 61511 and provides detailed insights and fundamental understanding of functional safety concepts, industry standards and the methodologies used to determine and maintain safety integrity levels (SILs) in safety instrumented systems used in the process industries. It emphasises the actions you need to take to comply with the functional safety standards.

The course is suitable for:

- Automation and control design & maintenance engineers and safety and risk engineers with some experience in SIS.
- Engineers from non-process industries with experience in functional safety in their discipline (e.g. machine protection, aviation, rail) and who are seeking an understanding of how functional safety is applied in the process industries. The course is not intended to provide education on functional safety for non-process industry applications, though many of the principles are transferrable.
- Engineers who do not satisfy the experience requirements for the FS Engineer (TÜV Rheinland) certificate, but who are looking for an understanding of functional safety principles and practice. The certificate will not be awarded until sufficient experience is gained.

The course is not suitable for recent graduates or tradespeople with limited experience. This course does not provide training in standards such as AS 4024 that focus on the safety of machinery.

What is the TÜV Rheinland Functional Safety Program?

TÜV Rheinland provides an internationally recognised certificate for Functional Safety Engineers as part of the TÜV Rheinland Functional Safety Program. As part of this program, the IICA Functional Safety Engineer SIS training course and exam have been reviewed and approved by TÜV Rheinland and the course presenter is a TÜV Rheinland certified Functional Safety Expert.

TÜV Rheinland Functional Safety Engineer Certificate Requirements

To qualify for the Functional Safety Engineer (TÜV Rheinland) certificate, participants must:

- Have at least three years of relevant Functional Safety experience (if unsure, contact IICA)
- Have engineer level responsibilities (degree, diploma or confirmation letter from employer)
- Complete the Functional Safety Engineer SIS Training
- Pass the exam at the completion of the course

A IICA 'Certificate of Training' will be issued to all participants who complete the four day course.

Why IICA FS Training?

Independent of SIS vendors

Internationally recognised certificate

Developed specifically for Australian industry

Course material based on the latest version of AS IEC 61511

Balance of practical and theoretical instruction

Structured around the IEC 61511 functional safety lifecycle, emphasising what you have to do to comply

Some advanced non-examinable material for more experienced participants

Interactive training by well regarded, highly experienced instructor

Extensive use of case studies & practical examples

Revision of prior day's work & half day revision to maximise exam success

38 hours towards Continuous Professional Development

Course Facilitator

Bob Weiss FSExp (TÜV Rheinland), FIChemE, Fellow IICA

Bob has more than 30 years' experience in Functional Safety, and has presented TÜV Rheinland Functional Safety courses in Australia since 2005. He receives consistently excellent feedback from participants.

A Member of the Standards Australia subcommittee responsible for the Functional Safety Standards AS 61508 and AS IEC 61511, Bob has over 40 years experience in operations, control systems design, risk analysis and consulting at Monsanto, ICI Australia and Honeywell.

Bob is highly regarded instructor and draws on his broad experience throughout the course.

Cost per person:

\$4,730 (incl. GST) if registered at least 4 weeks prior
\$5,225 (incl. GST) for late registration
5% Discount for IICA Members

The course fee covers all materials, catering, the final exam and the FS Engineer (TÜV Rheinland) certificate (if successful). If unsuccessful on the first attempt, a 1 hour one-on-one coaching session and a re-examination are provided at no extra cost.

2020 dates / locations: Brisbane: 23 - 27 March
Sydney: 22 - 26 June
Melbourne: 19 - 23 October

Course Schedule: Mon - Thurs 8:30am - 5:00pm incl 1/2 day revision
Friday 8:30am - 12:30pm Examination

In-house FSEng (TÜV Rheinland) courses (4.5 days)

Base price \$23,650 (incl. GST) (minimum charge) Up to 5 students
Extra Students, \$2,365 each (incl. GST) ie half price

Deposit 50% at time of booking
Balance 28 days before training commences
10% Cancellation fee

The host company provides:

Venue - Suitable room with projector & whiteboard
Catering - morning tea, lunch, afternoon tea

Date By arrangement with the instructor

Schedule Monday - Thursday 8:30am - 5:00pm
Friday 8:30am - 12:30pm



***One-day in-house Functional Safety Awareness courses are also available.**

IICA Functional Safety Engineer SIS Training Course

Learning Outcomes

The course material is based on the standard AS IEC 61511:2018 Ed. 2 Functional safety - Safety instrumented systems for the process industry sector (referred to here as IEC 61511). The related role of IEC 61508:2010 Ed. 2 *Functional safety of electrical / electronic / programmable electronic safety-related systems* (IEC 61508) is also explained.

The primary aim of the course is to equip all participants with a practical understanding of IEC 61511 such that they can understand and participate in those lifecycle activities relevant to their particular job role. It is not intended that by itself the course (including successful completion of the examination) is sufficient to allow successful candidates to lead lifecycle activities unsupervised, but it does provide a foundation for development into these roles or for fulfilment of these roles by individuals already having sufficient pre-course experience.

At the conclusion of the course, participants will be able to:

- Participate effectively in LOPA and other SIL determination studies
- Determine whether the design of a safety instrumented function (SIF) meets the required SIL
- Select a SIF architecture that both meets the required SIL and minimises spurious trips
- Select SIF components to meet the target SIL for that SIF

and will understand:

- The overall requirements of the IEC 61511 lifecycle and how it should be managed
- When compliance with IEC 61511 or IEC 61508 is legally required
- Which functional safety standard (IEC 61508, IEC 61511 or a machine safety standard) should be applied
- The meaning of SIS, SIF, SIL and other functional safety terminology
- The role of hazard analysis in setting SIL targets
- The importance and contents of the Safety Requirements Specification (SRS)
- The different types of failures and best practices for minimising them
- The requirements for developing safety related software as per IEC 61511
- The responsibilities of operation and maintenance to ensure a SIF meets its SIL
- How to proof test a SIF

Course Program

The course schedule is

Monday – Wednesday	8:30am - 5:00pm	Course material
Thursday	8:30am - 12:30pm	Course material
Thursday	1:00pm - 5:00pm	Individual or group revision
Friday	8:30am - 12:30pm	Examination

Inclusion of a revision afternoon has previously been found to be effective and popular with participants, and resulted in improved pass rates. If the exam is on the Thursday afternoon, candidates are being examined on material presented that morning and for which they have not had time to study.

The presentation style used promotes discussion and class interaction to maximise participation. A case study is used throughout the course to show how the principles apply in practice. This is reinforced through practical exercises including practice in key elements of SIL Determination and SIL Verification. Videos have been chosen to emphasise important elements of the course. Revision sessions start each day Tuesday to Thursday to re-emphasise the main points from the previous day.

Advanced Material

To meet the requirements of more experienced course participants some more advanced material that is not examinable is also presented. This allows more complex issues to be explored if participants are interested and enables the course emphasis to be tailored to suit the requirements of the participants.

IICA Functional Safety Engineer SIS Training Course

Course Program Details

Day 1

- Functional Safety & Process Safety
- Standards and Legislative Requirements
- Introduction to IEC 61511 and IEC 61508
- Hazard and Risk Assessment

Day 2

- Day 1 Revision
- SIL Determination & LOPA
- Safety Requirements Specification and Documentation
- Background Theory -
 - Faults and Failures
 - Random Failure Measures
 - Redundancy

Day 3

- Day 2 Revision
- Design and Engineering
 - Selecting SIF Components
 - Selecting Logic Solvers
 - SIF Design and SIL Verification
 - Minimising Engineering Errors
 - Application Software



Day 4

- Day 3 Revision
- Operation & Maintenance -
 - Proof Testing
 - Controlling Modifications
 - Other Requirements
- Functional Safety Management
- Revision and exam preparation

Day 5

Examination
The examination has been developed to test the major learning outcomes described above. Some more advanced material is not examinable and will be clearly identified.
The exam is in two parts:

Part 1 - 40 multiple choice questions (pass mark 30/40)

Part 2 - 20 short answer questions worth 2 marks each (pass mark 30/40)

The questions are designed to allow candidates to demonstrate a grasp of basic concepts and the ability to apply these concepts in real-life applications. The exam is “closed book”, although some formulae and tables will be provided for reference, as the exam is not a test of the ability to memorise standards clauses.

Candidates passing both exam parts and meeting the experience and qualification requirements will be issued a FS Engineer (TÜV Rheinland) certificate by TÜV Rheinland.

