



## Accredited Africa Training Institute for Capacity Development

Unit FO409, Hatfield Plaza · 1122 Burnett St, Hatfield 0028 · Pretoria, Gauteng · South Africa

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### COURSE BROCHURE

# Fault Find And Repair Electromagnetic And Particle Radiation Sensing Devices Training

Manufacturing, Engineering and Technology / Engineering and Related Design

Unit Standard 119807 · NQF Level 5 · 10 Credits · 7 Days

## COURSE OVERVIEW

This course equips learners with the skills to diagnose, troubleshoot, and repair faults in electromagnetic and particle radiation sensing devices used in industrial, medical, and environmental monitoring contexts. Participants will gain practical expertise in identifying malfunctions, performing corrective maintenance, and ensuring device compliance with safety standards. The training emphasizes systematic fault-finding methodologies and adherence to South African regulatory requirements.

|                 |                                            |
|-----------------|--------------------------------------------|
| Category        | Manufacturing, Engineering and Technology  |
| Subfield        | Engineering and Related Design             |
| Unit Standard   | 119807                                     |
| Accreditation   | SAQA Accredited · NQF Level 5 · 10 Credits |
| Duration        | 7 days                                     |
| Training Method | Online, On-Campus, In-House                |
| Certificate     | Issued via AATICD LMS – verifiable online  |

## LEARNING OUTCOMES

- Apply systematic fault-finding techniques to diagnose malfunctions in electromagnetic and particle radiation sensing devices.
- Analyze circuit diagrams and technical documentation to identify root causes of device failures.
- Implement corrective repairs using appropriate tools, components, and soldering techniques.
- Evaluate device performance against manufacturer specifications and safety standards.
- Demonstrate compliance with occupational health and safety regulations during repair procedures.
- Document repair processes and test results for quality assurance and traceability.

## WHO SHOULD ATTEND

- Technicians, engineers, and maintenance personnel responsible for the repair and calibration of radiation detection equipment in sectors such as mining, healthcare, nuclear energy, and environmental monitoring.

## COURSE OUTLINE

### Day 1: Introduction to Electromagnetic and Particle Radiation Sensing Devices

- Overview of electromagnetic spectrum and particle radiation (alpha, beta, gamma, neutrons).
- Common radiation sensing devices: Geiger-Müller counters, scintillation detectors, semiconductor detectors.
- Basic operating principles and typical applications in industry and medicine.
- Safety procedures and regulatory requirements for handling radiation sources.
- Introduction to fault diagnosis methodology and systematic troubleshooting.

### Day 2: Fundamentals of Electronic Circuits in Radiation Detectors

- Review of electronic components: resistors, capacitors, transistors, op-amps.
- Power supply circuits: high-voltage supplies for detectors.
- Amplifier circuits: charge-sensitive and shaping amplifiers.
- Discriminator and counter circuits for pulse processing.
- Practical exercise: measuring voltages and waveforms in a simple detector circuit.

### Day 3: Systematic Fault Finding Techniques

- Fault-finding strategies: visual inspection, functional checks, signal tracing.
- Using schematics and service manuals for troubleshooting.
- Common faults: power supply failures, cable breaks, sensor degradation.
- Practical exercise: fault-finding on a simulated Geiger-Müller counter.
- Record-keeping and reporting procedures.

### Day 4: Repair and Replacement of Components

- Safe disassembly procedures: handling sensitive detectors and high-voltage parts.
- Soldering techniques for through-hole and surface-mount components.
- Component identification and sourcing replacements.
- Replacing and aligning detector elements (e.g., photomultiplier tubes).
- Reassembly and initial functional testing.

### Day 5: Calibration and Performance Verification

- Calibration standards and traceability.
- Using calibration sources: Cs-137, Co-60, Am-241.
- Adjusting detector parameters: HV, discriminator threshold, amplifier gain.
- Performance tests: background count, efficiency, energy calibration.
- Practical exercise: calibrating a scintillation detector.
- Documentation and calibration certificates.

### Day 6: Advanced Troubleshooting and Data Analysis

- Advanced fault-finding: thermal issues, noise analysis, intermittent connections.
- Pulse height analysis and spectrum interpretation.
- Using software for data acquisition and analysis (e.g., Genie 2000).
- Digital detector interfaces and error logging.
- Practical exercise: diagnosing a fault in a spectroscopy system.

### Day 7: Integration, Safety, and Assessment

- Comprehensive repair scenario: simulated detector failure.
- Safety review: radiation protection, electrical safety, lockout/tagout.
- Final practical assessment: fault diagnosis, repair, calibration, and documentation.

- Review of course content and Q&A.;
- Issuance of certificates and course closure.

## ASSESSMENT & CERTIFICATION

Delegates are assessed through exercises and a final test. A mark of **50% or above** earns an **AATICD Certificate of Completion**, issued digitally with a unique verification code. This course carries **10 NQF credits** at **NQF Level 5**.

## PRICING (PER DELEGATE, EX-VAT)

| Delegates | Training Method      | Price per Delegate | Total       |
|-----------|----------------------|--------------------|-------------|
| 1         | Online               | R 29,600.00        | R 29,600.00 |
| 1         | In-House             | R 38,500.00        | R 38,500.00 |
| 1         | On-Campus (Pretoria) | R 44,400.00        | R 44,400.00 |

## UPCOMING SESSIONS

| Start       | End         | Method    | Venue                      |
|-------------|-------------|-----------|----------------------------|
| 31 Jul 2026 | 10 Aug 2026 | On-Campus | Mauritius                  |
| 03 Aug 2026 | 11 Aug 2026 | On-Campus | Dubai, UAE                 |
| 04 Aug 2026 | 12 Aug 2026 | On-Campus | Pretoria, South Africa     |
| 04 Aug 2026 | 12 Aug 2026 | On-Campus | Lagos, Nigeria             |
| 05 Aug 2026 | 13 Aug 2026 | On-Campus | Johannesburg, South Africa |
| 06 Aug 2026 | 14 Aug 2026 | On-Campus | Mauritius                  |
| 07 Aug 2026 | 17 Aug 2026 | On-Campus | Cape Town, South Africa    |
| 10 Aug 2026 | 18 Aug 2026 | On-Campus | Pretoria, South Africa     |

Contact us if no suitable date is listed – on-demand sessions can be arranged for groups.

## HOW TO GET A QUOTE OR APPLY

1. **Get an instant quotation online:** visit [www.aaticd.co.za](http://www.aaticd.co.za), open the page for this course (Unit Standard 119807) and click **Get A Quote / Apply**. Select your training method and number of delegates – your quotation is generated immediately and emailed to you with the course brochure attached.
2. **Apply by email:** send the course title, your preferred training method (Online, In-House or On-Campus Pretoria), the number of delegates and your preferred dates to [apply@aaticd.co.za](mailto:apply@aaticd.co.za) – our team will reply with a formal quotation.
3. **Apply by phone or WhatsApp:** call **+27 12 004 8389** or WhatsApp **+27 65 077 6310** and we will prepare your quotation and reserve your seats.
4. **Confirm your booking:** accept the quotation and settle the invoice. As soon as payment is confirmed your delegates are enrolled and receive their AATICD LMS login details by email, along with joining instructions for their chosen training method.

Group discounts apply automatically – the more delegates you enrol, the lower the price per delegate. No payment is required to request a quotation.

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