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

# Apply Engineering Mathematics In The Measurement Control And Instrumentation Environment Training

Manufacturing, Engineering and Technology / Engineering and Related Design

Unit Standard 119808 · NQF Level 5 · 10 Credits · 7 Days

## COURSE OVERVIEW

This course equips learners with the mathematical skills necessary to perform engineering calculations in measurement, control, and instrumentation environments. It covers algebraic, trigonometric, and statistical methods used to analyse and solve problems related to process control, calibration, and instrumentation systems.

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|---|---|
| Category | Manufacturing, Engineering and Technology |
| Subfield | Engineering and Related Design |
| Unit Standard | 119808 |
| 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 algebraic methods to solve engineering problems in measurement and control systems.
- Use trigonometric functions to analyse waveforms and angular relationships in instrumentation.
- Evaluate statistical data to determine measurement uncertainty and system performance.
- Demonstrate proficiency in using mathematical formulas for calibration and signal processing.
- Analyse graphical data to interpret trends and relationships in control systems.
- Solve problems involving exponents, logarithms, and complex numbers in instrumentation contexts.

## WHO SHOULD ATTEND

- This course is designed for engineering technicians, technologists, and artisans working in measurement, control, and instrumentation fields who require foundational mathematical competencies.

## COURSE OUTLINE

### Day 1: Foundational Mathematics and Number Systems

- Role of mathematics in engineering contexts.
- Number systems: binary, octal, hexadecimal.
- Basic algebra: solving equations, transposition of formulae.
- Units and dimensional analysis.
- SI units and prefixes.
- Practical exercises on unit conversion.

### Day 2: Geometry, Trigonometry, and Graphs

- Geometry: areas of circles, rectangles, triangles; volumes of cylinders, spheres.
- Trigonometry: sine, cosine, tangent; right-angled triangles.
- Plotting graphs: linear, quadratic, exponential.
- Determining gradients and intercepts.
- Application to sensor calibration curves.

### Day 3: Vectors, Matrices, and Complex Numbers

- Vectors: representation, addition, subtraction, dot product.
- Matrices: addition, multiplication, determinant, inverse.
- Solving simultaneous equations using matrices.
- Complex numbers: real and imaginary parts, modulus, argument.
- Phasor representation in instrumentation.

### Day 4: Calculus – Differentiation and Integration

- Limits and continuity.
- Differentiation: power rule, product rule, chain rule.
- Applications: velocity, acceleration, rate of change in transducers.
- Integration: indefinite and definite integrals.
- Area under curve, mean and RMS values.
- Practical examples from flow and temperature sensors.

### Day 5: Differential Equations and Laplace Transforms

- First-order ODEs: formulation and solution.
- Second-order ODEs: characteristic equation, overdamped, underdamped.
- Introduction to Laplace transforms.
- Transform of common functions (step, ramp, exponential).
- Inverse Laplace transforms.
- Application to control system response.

### Day 6: Statistics and Probability in Measurement

- Descriptive statistics: central tendency, dispersion.
- Probability distributions: normal, binomial, Poisson.
- Measurement uncertainty: systematic and random errors.
- Confidence intervals and error bars.
- Linear regression: least squares method.
- Correlation coefficient and goodness of fit.

### Day 7: Integration and Practical Application

- Case studies: temperature control loop, pressure measurement, flow computation.
- Mathematical modelling of a simple process.
- PID controller parameter calculation.
- Data analysis and reporting.
- Summative assessment: practical problem set.
- Course review and Q&A.;

## 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 | Lagos, Nigeria |
| 03 Aug 2026 | 11 Aug 2026 | On-Campus | Mauritius |
| 04 Aug 2026 | 12 Aug 2026 | On-Campus | Cape Town, South Africa |
| 05 Aug 2026 | 13 Aug 2026 | On-Campus | Dubai, UAE |
| 06 Aug 2026 | 14 Aug 2026 | On-Campus | Pretoria, South Africa |
| 06 Aug 2026 | 14 Aug 2026 | On-Campus | Lagos, Nigeria |
| 07 Aug 2026 | 17 Aug 2026 | On-Campus | Johannesburg, South Africa |
| 10 Aug 2026 | 18 Aug 2026 | On-Campus | Cape Town, 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**, open the page for this course (Unit Standard 119808) 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** — 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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