



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

Imagery Sensor Operations Principles Explained

Law, Military Science and Security / Sovereignty of the State

Unit Standard 244515 · NQF Level 5 · 8 Credits · 5 Days

COURSE OVERVIEW

This course provides a comprehensive understanding of the principles governing imagery sensor operations, including sensor types, data acquisition, and processing techniques. Learners will gain the ability to explain and apply these principles in various operational contexts, enhancing their technical competency in remote sensing and geospatial intelligence.

Category	Law, Military Science and Security
Subfield	Sovereignty of the State
Unit Standard	244515
Accreditation	SAQA Accredited · NQF Level 5 · 8 Credits
Duration	5 days
Training Method	Online, On-Campus, In-House
Certificate	Issued via AATICD LMS – verifiable online

LEARNING OUTCOMES

- Explain the fundamental principles of imagery sensor operations, including electromagnetic spectrum and sensor resolutions.
- Differentiate between passive and active sensor systems and their applications.
- Analyze the factors affecting image quality and sensor performance.
- Apply calibration and correction techniques to ensure data accuracy.
- Evaluate sensor data for specific operational requirements.
- Demonstrate the ability to interpret imagery sensor outputs for decision-making.

WHO SHOULD ATTEND

- This course is designed for technicians, analysts, and professionals involved in remote sensing, geospatial data collection, or surveillance operations who need to understand imagery sensor fundamentals.

COURSE OUTLINE

Day 1: Fundamentals of Imagery Sensors

- Introduction to remote sensing and imagery sensors
- The electromagnetic spectrum: wavelengths, bands, and atmospheric windows
- Passive sensors: optical, thermal infrared
- Active sensors: radar, LiDAR
- Sensor resolution: spatial, spectral, radiometric, temporal
- Overview of sensor platforms: satellite, airborne, UAV
- Key sensor components: optics, detectors, scanning mechanisms
- Applications: mapping, agriculture, defence, environmental monitoring

Day 2: Sensor Operation Principles and Data Acquisition

- Image formation: spatial sampling, quantization
- Scanning mechanisms: whiskbroom (e.g., Landsat TM), pushbroom (e.g., SPOT), framing arrays
- Radiometric calibration: gain, offset, dark current correction
- Geometric calibration: interior and exterior orientation
- Atmospheric effects on imagery: scattering, absorption
- Sensor noise: shot noise, readout noise, pattern noise
- Data acquisition workflow: tasking, sensor command, data download
- Quality metrics: SNR, MTF, dynamic range

Day 3: Sensor Performance and Image Quality

- Modulation transfer function (MTF): definition, measurement, interpretation
- Signal-to-noise ratio (SNR): sources of noise, calculation, improvement techniques
- Radiometric resolution: bit depth, dynamic range
- Spatial resolution: GSD, Nyquist frequency, aliasing
- Temporal resolution: revisit time, orbital considerations
- Trade-offs: high resolution vs wide swath vs frequent revisit
- Image quality assessment: visual inspection, statistical measures
- Case studies: comparing sensors (e.g., Landsat, Sentinel, WorldView)

Day 4: Sensor Calibration and Data Correction

- Radiometric calibration: absolute vs relative, lab calibration, vicarious calibration
- Cross-calibration between sensors
- Geometric correction: sensor model, ground control points, DEM
- Orthorectification: removing terrain distortion
- Atmospheric correction: dark object subtraction, 6S, MODTRAN
- Spectral calibration: band centre, bandwidth, spectral response function
- Data formats: GeoTIFF, HDF, NetCDF
- Practical calibration workflow using open-source tools (e.g., QGIS, SNAP)

Day 5: Advanced Applications and Practical Integration

- Advanced sensors: hyperspectral imaging, thermal infrared, synthetic aperture radar (SAR)
- Sensor tasking and acquisition planning for specific applications
- Data fusion: combining multisensor imagery
- Quality assurance pipeline: from raw data to analysis-ready product
- Emerging trends: small satellites, UAV sensors, AI in sensor calibration

- Case study: precision agriculture – selecting sensor, band, and resolution
- Case study: disaster response – rapid tasking and processing
- Mini-project: design an acquisition plan and process sample data

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 **8 NQF credits** at **NQF Level 5**.

PRICING (PER DELEGATE, EX-VAT)

Delegates	Training Method	Price per Delegate	Total
1	Online	R 24,200.00	R 24,200.00
1	In-House	R 31,400.00	R 31,400.00
1	On-Campus (Pretoria)	R 36,200.00	R 36,200.00

UPCOMING SESSIONS

Start	End	Method	Venue
10 Aug 2026	14 Aug 2026	On-Campus	Durban, South Africa
10 Aug 2026	14 Aug 2026	On-Campus	Abu Dhabi, UAE
10 Aug 2026	14 Aug 2026	On-Campus	Pretoria, South Africa
10 Aug 2026	14 Aug 2026	On-Campus	Dubai, UAE
10 Aug 2026	14 Aug 2026	On-Campus	Cape Town, South Africa
10 Aug 2026	14 Aug 2026	On-Campus	Mauritius
17 Aug 2026	21 Aug 2026	On-Campus	Dubai, UAE
17 Aug 2026	21 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, open the page for this course (Unit Standard 244515) 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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