



## 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

# Image Analysis Methodology Application

Law, Military Science and Security / Sovereignty of the State

Unit Standard 244501 · NQF Level 5 · 12 Credits · 9 Days

## COURSE OVERVIEW

This course equips learners with the skills to systematically apply image analysis methodologies in technical and scientific contexts. Participants will learn to select appropriate techniques, process digital images, and interpret results to support decision-making in fields such as remote sensing, quality control, or medical imaging.

|                 |                                            |
|-----------------|--------------------------------------------|
| Category        | Law, Military Science and Security         |
| Subfield        | Sovereignty of the State                   |
| Unit Standard   | 244501                                     |
| Accreditation   | SAQA Accredited · NQF Level 5 · 12 Credits |
| Duration        | 9 days                                     |
| Training Method | Online, On-Campus, In-House                |
| Certificate     | Issued via AATICD LMS – verifiable online  |

## LEARNING OUTCOMES

- Apply fundamental image analysis methodologies to extract meaningful information from digital images.
- Analyze image features using appropriate software tools and techniques.
- Evaluate the suitability of different image analysis methods for specific applications.
- Interpret and report image analysis results accurately.
- Implement quality assurance measures to ensure reliability of image analysis outputs.
- Demonstrate the ability to troubleshoot common issues in image analysis workflows.

## WHO SHOULD ATTEND

- This course is designed for technicians, analysts, and professionals who work with digital images in sectors such as geospatial analysis, manufacturing, or healthcare and need to apply structured image analysis methods.

## COURSE OUTLINE

### Day 1: Introduction to Image Analysis and Quality Control

- Overview of image analysis in industrial and scientific contexts.
- Digital image representation: pixels, bit depth, and color spaces.
- Image quality metrics: resolution, contrast, and noise.
- Standardization and calibration in image acquisition.
- Introduction to image file formats and compression.
- Ethical considerations and data integrity in image analysis.

### Day 2: Image Acquisition and Pre-processing

- Hardware considerations: cameras, lenses, and lighting.
- Acquisition protocols for reproducibility.
- Noise reduction filters: mean, median, Gaussian.
- Contrast enhancement: histogram equalization, gamma correction.
- Geometric transformations and registration.
- Color space conversion and channel extraction.

### Day 3: Image Segmentation Techniques

- Global and adaptive thresholding (Otsu, Sauvola).
- Edge detection: Sobel, Canny, Laplacian.
- Region growing and watershed segmentation.
- Morphological operations: erosion, dilation, opening, closing.
- Segmentation validation: precision, recall, F1-score.
- Handling overlapping objects and clutter.

### Day 4: Feature Extraction and Measurement

- Feature types: shape, size, intensity, texture.
- Shape descriptors: Feret diameter, convex hull, solidity.
- Intensity features: mean, variance, skewness, kurtosis.
- Texture analysis: Gray-Level Co-occurrence Matrix (GLCM).
- Local Binary Patterns (LBP) and Gabor filters.
- Data export for statistical analysis.

### Day 5: Image Analysis Software Tools

- Overview of open-source and commercial software.
- ImageJ/Fiji: plugins, macro recording, and batch processing.
- CellProfiler: building pipelines for cell analysis.
- MATLAB Image Processing Toolbox: scripting and functions.
- Python libraries: OpenCV, scikit-image, Pillow.
- Automation and reproducibility with scripts.

### Day 6: Classification and Pattern Recognition

- Supervised vs unsupervised learning in image analysis.
- Feature selection and dimensionality reduction (PCA).
- Classification algorithms: k-NN, SVM, random forest.
- Training, validation, and test sets.
- Performance metrics: accuracy, confusion matrix, ROC curve.

- Introduction to deep learning for image classification.

#### Day 7: Advanced Topics: Deep Learning and Object Detection

- CNN architecture: convolution, pooling, fully connected layers.
- Transfer learning with pre-trained models (VGG, ResNet).
- Data augmentation to improve model robustness.
- Object detection frameworks: YOLO, SSD, Faster R-CNN.
- Semantic segmentation with U-Net.
- Computational considerations: GPU usage and memory management.

#### Day 8: Quality Assurance and Validation in Image Analysis

- Validation of image analysis methods: accuracy, precision, repeatability.
- Reference standards and ground truth generation.
- Statistical analysis: t-tests, ANOVA, Bland-Altman plots.
- Regulatory compliance: ISO 9001, 21 CFR Part 11.
- Audit trails and data integrity.
- Writing standard operating procedures (SOPs).

#### Day 9: Integration, Case Studies, and Final Assessment

- Building end-to-end pipelines: acquisition to reporting.
- Case studies: pharmaceutical, automotive, agriculture, pathology.
- Troubleshooting common issues in image analysis.
- Final project: design and execute an analysis on provided data.
- Presentation of results and peer feedback.
- Course wrap-up and resources for continued learning.

## 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 **12 NQF credits** at **NQF Level 5**.

## PRICING (PER DELEGATE, EX-VAT)

| Delegates | Training Method      | Price per Delegate | Total       |
|-----------|----------------------|--------------------|-------------|
| 1         | Online               | R 35,000.00        | R 35,000.00 |
| 1         | In-House             | R 45,500.00        | R 45,500.00 |
| 1         | On-Campus (Pretoria) | R 52,500.00        | R 52,500.00 |

## UPCOMING SESSIONS

| Start       | End         | Method    | Venue                   |
|-------------|-------------|-----------|-------------------------|
| 10 Aug 2026 | 20 Aug 2026 | On-Campus | Durban, South Africa    |
| 10 Aug 2026 | 20 Aug 2026 | On-Campus | Mauritius               |
| 11 Aug 2026 | 21 Aug 2026 | On-Campus | Cape Town, South Africa |
| 12 Aug 2026 | 24 Aug 2026 | On-Campus | Dubai, UAE              |
| 13 Aug 2026 | 25 Aug 2026 | On-Campus | Pretoria, South Africa  |
| 14 Aug 2026 | 26 Aug 2026 | On-Campus | Abu Dhabi, UAE          |
| 17 Aug 2026 | 27 Aug 2026 | On-Campus | Shenzhen, China         |
| 18 Aug 2026 | 28 Aug 2026 | On-Campus | Dubai, UAE              |

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 244501) 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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