

**AUTOMOTIVE TECHNICAL ACADEMY (ATA)**

**ATA-M000**

**Automotive Mechanical Engineering Foundation**

**Curriculum Framework (Version 1.0)**

**Programme Status: Proposed for Locking**

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**Programme Information**

**Programme Code:**

ATA-M000

**Programme Title:**

Automotive Mechanical Engineering Foundation

**Qualification Level:**

Foundation Certificate

**Duration:**

12 Weeks

**Training Days:**

5 Days per Week

**Hours Per Day:**

8 Hours

**Total Contact Hours:**

**480 Hours**

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**Teaching Philosophy**

- **70% Practical = 336 Hours**
  - **30% Theory = 144 Hours**
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**Entry Requirement**

- Senior Secondary School Certificate (SSCE) or equivalent.
- Basic literacy and numeracy.
- Passion for automotive engineering.

No prior automotive experience is required.

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**Programme Goal**

## ATA-M000

To provide every Mechanical Engineering student with a strong foundation in workshop safety, engineering principles, mechanical systems, precision measurement, diagnostic thinking, servicing techniques, and professional work habits before progressing to specialist training in Engine Technology, Transmission Systems, or Chassis Systems.

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### Graduate Competency Profile

Upon successful completion, graduates shall be able to:

- Demonstrate safe workshop practices.
  - Identify and correctly use automotive hand tools.
  - Operate common workshop equipment safely.
  - Perform precision measurements using engineering instruments.
  - Interpret basic workshop manuals and service information.
  - Identify mechanical components and their functions.
  - Apply correct fastening and torque procedures.
  - Perform basic vehicle servicing operations.
  - Conduct systematic visual and mechanical inspections.
  - Apply structured diagnostic thinking.
  - Produce accurate service records and job reports.
  - Demonstrate professional ethics, teamwork, and workplace communication.
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### Programme Structure

| Module  | Title                                                             | Weeks | Hours |
|---------|-------------------------------------------------------------------|-------|-------|
| M000-01 | Workshop Safety, Professional Ethics & Engineering Practice       | 2     | 80    |
| M000-02 | Automotive Engineering Fundamentals & Mechanical Principles       | 2     | 80    |
| M000-03 | Automotive Hand Tools, Measuring Instruments & Workshop Equipment | 2     | 80    |
| M000-04 | Mechanical Components, Fasteners, Bearings, Seals & Lubrication   | 2     | 80    |
| M000-05 | Introduction to Automotive Mechanical Systems & Basic Servicing   | 2     | 80    |

## ATA-M000

| Module       | Title                                                              | Weeks           | Hours            |
|--------------|--------------------------------------------------------------------|-----------------|------------------|
| M000-06      | Mechanical Inspection, Diagnostic Thinking & Competency Assessment | 2               | 80               |
| <b>TOTAL</b> |                                                                    | <b>12 Weeks</b> | <b>480 Hours</b> |

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### Module 1

#### Workshop Safety, Professional Ethics & Engineering Practice

**Duration:** 2 Weeks

##### Topics

- Workshop rules and regulations
- Occupational health and safety
- Personal Protective Equipment (PPE)
- Fire prevention and emergency response
- Safe lifting techniques
- Workshop housekeeping (5S principles)
- Hazard identification and risk assessment
- Environmental protection and waste management
- Professional ethics
- Customer care and workplace communication
- Introduction to engineering documentation

##### Practical Competencies

Students will be able to:

- Wear and maintain PPE correctly.
- Identify workshop hazards.
- Use fire extinguishers appropriately.
- Maintain a clean and organized workstation.
- Complete basic workshop documentation.

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### Module 2

#### Automotive Engineering Fundamentals & Mechanical Principles

**Duration:** 2 Weeks

##### Topics

## **ATA-M000**

- Introduction to automotive engineering
- SI units and measurement systems
- Force, motion, work, power and torque
- Friction and lubrication
- Heat and thermal expansion
- Mechanical advantage
- Engineering materials
- Ferrous and non-ferrous metals
- Plastics and composite materials
- Basic engineering drawings and symbols

### **Practical Competencies**

Students will:

- Identify engineering materials.
  - Calculate basic workshop measurements.
  - Apply torque specifications.
  - Interpret simple engineering drawings.
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## **Module 3**

### **Automotive Hand Tools, Measuring Instruments & Workshop Equipment**

**Duration:** 2 Weeks

#### **Topics**

##### **Hand Tools**

- Spanners
- Socket sets
- Screwdrivers
- Pliers
- Hammers
- Chisels
- Punches
- Pullers

##### **Measuring Instruments**

- Steel rule
- Vernier caliper
- Outside micrometer

- Dial indicator
- Feeler gauge
- Thread pitch gauge
- Torque wrench

### **Workshop Equipment**

- Hydraulic jack
- Jack stands
- Hydraulic press
- Engine crane
- Engine stand
- Air compressor
- Parts washer
- Bench grinder
- Drill press

### **Practical Competencies**

Students will:

- Select the correct tool for each task.
- Perform accurate precision measurements.
- Operate workshop equipment safely.
- Maintain and store tools correctly.

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## **Module 4**

### **Mechanical Components, Fasteners, Bearings, Seals & Lubrication**

**Duration:** 2 Weeks

#### **Topics**

- Nuts and bolts
- Thread types
- Washers
- Studs
- Keys and keyways
- Bearings
- Bushes
- Shafts
- Springs

- Gaskets
- Oil seals
- O-rings
- Greases
- Lubricants
- Sealants
- Thread-locking compounds

### **Practical Competencies**

Students will:

- Identify common mechanical components.
  - Select appropriate fasteners.
  - Replace seals and gaskets.
  - Apply lubricants correctly.
  - Tighten fasteners using proper torque procedures.
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## **Module 5**

### **Introduction to Automotive Mechanical Systems & Basic Servicing**

**Duration:** 2 Weeks

#### **Topics**

Overview of:

- Engine systems
- Transmission systems
- Clutch systems
- Steering systems
- Suspension systems
- Brake systems
- Cooling systems
- Fuel systems
- Exhaust systems
- Wheels and tyres

Basic servicing:

- Engine oil replacement
- Oil filter replacement
- Air filter replacement

- Cabin filter replacement
- Greasing procedures
- Fluid level inspection
- Visual inspection
- Service scheduling

### **Practical Competencies**

Students will:

- Carry out routine vehicle servicing.
  - Perform pre-service inspections.
  - Follow manufacturer service schedules.
  - Complete service records.
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## **Module 6**

### **Mechanical Inspection, Diagnostic Thinking & Competency Assessment**

**Duration:** 2 Weeks

#### **Topics**

- Customer complaint analysis
- Observation techniques
- Visual inspection
- Functional inspection
- Root cause analysis
- Basic troubleshooting
- Job planning
- Repair verification
- Quality control
- Professional reporting

### **Practical Competencies**

Students will:

- Conduct systematic inspections.
  - Identify basic mechanical faults.
  - Develop logical diagnostic processes.
  - Verify completed work.
  - Prepare professional inspection reports.
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### **Required Foundation Workshop Facilities**

- Mechanical Foundation Workshop
  - Engineering Measurement Laboratory
  - Tool and Equipment Training Room
  - Basic Vehicle Service Bay
  - Safety and PPE Training Area
  - Mechanical Inspection Bay
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### **Essential Training Equipment**

Students should train with:

#### **Hand Tools**

- Professional spanner sets
- Socket sets
- Torque wrenches
- Screwdrivers
- Pliers
- Pullers
- Bearing installers

#### **Measuring Equipment**

- Vernier calipers
- Micrometers
- Dial indicators
- Feeler gauges
- Torque testers
- Thread gauges

#### **Workshop Equipment**

- Hydraulic jacks
- Axle stands
- Engine cranes
- Engine stands
- Hydraulic presses
- Air compressors
- Workbenches
- Bench grinders



- Oil drain systems

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**Assessment Structure**

| <b>Assessment</b>                          | <b>Weight</b> |
|--------------------------------------------|---------------|
| Continuous Practical Assessment            | 35%           |
| Practical Trade Tests                      | 30%           |
| Written Examination                        | 15%           |
| Practical Competency Project               | 15%           |
| Professional Conduct & Workshop Discipline | 5%            |
| <b>TOTAL</b>                               | <b>100%</b>   |