AUTOMOTIVE TECHNICAL ACADEMY (ATA)

ATA-EV100

Electric Vehicle Systems Technology

Curriculum Framework (Version 1.0)

Programme Status: Proposed for Approval

Programme Information

Programme Code:

ATA-EV100

Programme Title:

Electric Vehicle Systems Technology

Qualification Level:

Professional Diploma

Duration:

48 Weeks

Training Days:

5 Days Per Week

Hours Per Day:

8 Hours

Total Contact Hours:

1,920 Hours

Teaching Philosophy

- **70% Practical = 1,344 Hours**
- **30% Theory = 576 Hours**

The programme follows ATA's competency-based, practical-first model, emphasizing hands-on laboratory work, live vehicle diagnostics, high-voltage safety, battery servicing, system testing, and professional workshop practice using OEM-informed procedures.

Entry Requirement

Successful completion of:

ATA-E000 – Automotive Electrical & Electronics Foundation

or

Recognition of Prior Learning (RPL) in accordance with ATA admission policy.

Programme Goal

To produce highly competent Electric Vehicle (EV) technicians capable of safely inspecting, diagnosing, servicing, maintaining, testing, and repairing battery electric vehicles (BEVs), hybrid electric vehicles (HEVs), plug-in hybrid electric vehicles (PHEVs), charging systems, and associated high-voltage components.

Graduate Competency Profile

Graduates will be able to:

- Apply high-voltage safety procedures and isolation techniques.
- Identify and service BEV, HEV, and PHEV architectures.
- Diagnose high-voltage battery packs and Battery Management Systems (BMS).
- Inspect, test, and service electric motors and drive units.
- Diagnose inverters, converters, onboard chargers, and DC-DC converters.
- Service AC and DC charging systems.
- Inspect regenerative braking systems.
- Diagnose EV cooling and thermal management systems.
- Use professional EV diagnostic equipment and software.
- Perform post-repair validation and commissioning.
- Maintain service documentation and quality assurance records.

Programme Structure

Module	Title	Weeks	Hours
EV100-01	High-Voltage Safety, Workshop Practice & EV Service Equipment	4	160
EV100-02	Electric Vehicle Fundamentals & Vehicle Architectures	5	200
EV100-03	High-Voltage Battery Systems & Battery Management Systems (BMS)	8	320
EV100-04	Electric Motors, Inverters, Converters & Power Electronics	7	280

Module	Title	Weeks	Hours
EV100-05	Charging Systems, Charging Infrastructure & Energy Management	6	240
EV100-06	Thermal Management, Regenerative Braking & Auxiliary Systems	5	200
EV100-07	EV Diagnostics, Software Configuration & System Commissioning	5	200
EV100-08	Workshop Management, Environmental Compliance & Quality Assurance	2	80
EV100-09	Integrated Electric Vehicle Service Projects	4	160
EV100-10	Industrial Attachment, Capstone Project & Final Assessment	2	80
TOTAL		**48 Weeks**	**1,920 Hours**

Module 1

High-Voltage Safety, Workshop Practice & EV Service Equipment

Duration: 4 Weeks

Topics

- High-voltage hazards
- Electrical isolation procedures
- Lock-out/tag-out (LOTO)
- Personal protective equipment (PPE)
- Insulated tools
- Emergency response procedures
- EV workshop organization
- Risk assessment
- Safe lifting and handling of EV components

Practical Competencies

Students will:

- Safely isolate high-voltage systems.

- Verify zero-energy conditions before service.
- Select and use insulated tools correctly.
- Apply emergency response procedures for EV workshops.

Module 2

Electric Vehicle Fundamentals & Vehicle Architectures

Duration: 5 Weeks

Topics

- BEV architecture
- HEV architecture
- PHEV architecture
- EV driveline layouts
- Energy flow
- Vehicle control modules
- Communication networks
- Auxiliary electrical systems

Practical Competencies

Students will:

- Identify EV architectures.
- Trace energy flow through propulsion systems.
- Inspect major drivetrain components.
- Interpret EV system diagrams.

Module 3

High-Voltage Battery Systems & Battery Management Systems (BMS)

Duration: 8 Weeks

Topics

- Lithium-ion battery technology
- Battery modules and packs
- Battery Management Systems (BMS)
- Cell balancing
- State of Charge (SOC)
- State of Health (SOH)
- Battery diagnostics

- Battery cooling
- Safe battery handling
- Battery replacement procedures

Practical Competencies

Students will:

- Inspect battery assemblies.
- Diagnose battery faults.
- Test BMS operation.
- Evaluate battery performance.
- Follow approved battery service procedures.

Module 4

Electric Motors, Inverters, Converters & Power Electronics

Duration: 7 Weeks

Topics

- Electric traction motors
- Motor control principles
- Inverters
- DC-DC converters
- Onboard chargers
- High-voltage cables
- Connectors
- Power electronics cooling
- System diagnostics

Practical Competencies

Students will:

- Inspect electric drive units.
- Diagnose inverter and converter faults.
- Test motor performance.
- Verify power electronics operation.

Module 5

Charging Systems, Charging Infrastructure & Energy Management

Duration: 6 Weeks

Topics

- AC charging
- DC fast charging
- Charging connectors and standards
- Charging station components
- Charging communication basics
- Smart charging concepts
- Energy management
- Charging fault diagnosis

Practical Competencies

Students will:

- Inspect charging equipment.
- Test charging system operation.
- Diagnose charging faults.
- Verify safe charging performance.

Module 6

Thermal Management, Regenerative Braking & Auxiliary Systems

Duration: 5 Weeks

Topics

- Battery cooling
- Power electronics cooling
- Cabin thermal systems
- Heat pump overview
- Regenerative braking
- Electric vacuum pumps
- Electric coolant pumps
- Auxiliary systems
- Performance testing

Practical Competencies

Students will:

- Inspect thermal management systems.
- Diagnose cooling performance.
- Test regenerative braking functions.

- Verify auxiliary system operation.

Module 7

EV Diagnostics, Software Configuration & System Commissioning

Duration: 5 Weeks

Topics

- OEM diagnostic procedures
- Scan tool operation
- Diagnostic Trouble Codes (DTCs)
- Software updates
- Module configuration
- Functional testing
- Performance validation
- Commissioning procedures

Practical Competencies

Students will:

- Diagnose EV faults.
- Perform approved software updates.
- Configure supported control modules.
- Validate system performance after repair.

Module 8

Workshop Management, Environmental Compliance & Quality Assurance

Duration: 2 Weeks

Topics

- Job estimation
- Service documentation
- Battery storage and transport awareness
- Environmental responsibilities
- Customer communication
- Warranty procedures
- Quality assurance
- Entrepreneurship

Practical Competencies

Students will:

- Prepare quotations.
- Complete service reports.
- Maintain workshop records.
- Conduct quality inspections before vehicle release.

Module 9

Integrated Electric Vehicle Service Projects

Duration: 4 Weeks

Students complete comprehensive practical projects including:

- High-voltage system isolation
- Battery inspection and diagnosis
- Electric motor inspection
- Charging system testing
- Thermal management diagnosis
- Software diagnostics
- Complete system verification
- Customer handover documentation

Module 10

Industrial Attachment, Capstone Project & Final Assessment

Duration: 2 Weeks

Students complete:

- Supervised industrial attachment
- Comprehensive EV diagnosis and service project
- Practical trade test
- Written examination
- Technical presentation
- Portfolio assessment
- Exit competency assessment

Required Laboratories & Workshops

- High-Voltage Safety Training Laboratory
- Electric Vehicle Powertrain Laboratory

- Battery & BMS Laboratory
- Power Electronics Laboratory
- Charging Systems & Infrastructure Laboratory
- Thermal Management Laboratory
- EV Diagnostics & Software Configuration Centre
- Quality Inspection & Commissioning Bay

Essential Training Equipment

Students should train with:

- High-voltage insulated tool kits
- Class-rated insulated gloves and PPE
- High-voltage safety barriers and lock-out/tag-out kits
- EV diagnostic scan tools
- Digital multimeters rated for high-voltage systems
- Insulation resistance testers
- Battery analyzers
- BMS training boards
- Electric motor training units
- Inverter and converter demonstration units
- AC and DC charging stations (training models)
- Thermal imaging cameras
- Oscilloscopes
- Battery lifting table
- EV training vehicles (BEV, HEV, and PHEV where available)

Assessment Structure

Assessment	Weight
Continuous Practical Assessment	35%
Practical Trade Tests	30%
Written Examination	15%
Capstone EV Service Project	15%
Professional Conduct & Industrial Attachment	5%

Assessment	Weight
TOTAL	**100%**

Career Opportunities

Graduates may work as:

- Electric Vehicle Service Technician
- Hybrid Vehicle Technician
- EV Diagnostic Specialist
- High-Voltage Systems Technician
- Battery & BMS Technician
- EV Charging Infrastructure Technician
- EV Fleet Maintenance Technician
- EV Technical Instructor
- EV Workshop Supervisor
- Electric Mobility Service Business Owner