School of Construction and Engineering Trades

NZ3097

New Zealand Certificate in Automotive Engineering (Level 3)

Student Handbook

NZ Certificate in Automotive Engineering (Level 3)

Available on the Programme site on Moodle

This document is correct at time of publishing – February 2025

Table of Contents

School Welcome

Neil McDonald (Head of School)

Nau mai, Haere mai. Welcome to the School of Construction and Engineering Trades.
The School of Construction and Engineering Trades is proud to offer the best range of trades training in the region. Our programmes provide learning opportunities in a comprehensive range of theoretical and practical skills directly related to the workplace and our graduates are in high demand throughout the many industries we support.

The School of Construction and Engineering Trades offers you a learning environment that is as close to the real world as we can make it. Your learning will go beyond the classroom, and you will spend much of your time developing the hands-on skills which you will require if you are to succeed in your chosen field.

Learning at WelTec is a two-way partnership. You will learn from an experienced team of highly respected and professional tutors. They will do all they can to help you while you are here, but your success will not just depend on us.

You must bring with you a keen attitude to your studies, a willingness to learn, and respect for those around you who also wish to learn.

When you immerse yourself in your programme of study with energy and enthusiasm you will leave here with a qualification that will enable you to build your future. I wish you all the best for your studies.

Ngā mihi
Neil McDonald
Head of School

Use of Handbook

This handbook provides important information about your programme of study this year. It outlines what you can expect to achieve and regulations that you need to know about.

The Student Guide provides more information about the services that are available at Whitireia and WelTec to help you succeed in your studies. It refers you to policies and procedures that apply to students. The Student Guide is available in a downloadable version on Moodle and the website and in a printed copy at the School Administration office.

Programme Staff

Tom Dailly (Programme Manager)

Tutors

Kerry Butters
Vijay Chhika
Grant Davies
Carl Donaldson
William Fowles
Matt Glover
Greg Gouws
Husmuck Kala
Ron Lal
Stephanie Macdonald
Jason Robertson
Stuart White

Resources

Resources Provided:

- Overalls
- Steel cap boots
- Safety glasses
- Resource books
- Toolbox

Students to Supply/bring:

- Pens
- PPE items if not supplied
- Notebook

Programme Aim

This programme ensures graduates will meet the Strategic Purpose Statement and Outcome Statements of the New Zealand Certificate in Automotive Engineering (Level 3), whether enrolled full time or as a Managed Apprentice trainee. Graduates will be guided by their tutor and as a Managed Apprentice by their employer as well to gain the skills, knowledge and attributes to work within safe working practices under limited supervision to service general automotive systems.

Graduate Outcomes

Graduates will be able to:

1. Follow workplace policies, procedures and relevant regulations to work safely and effectively in an automotive workshop.
2. Use tools and equipment to complete basic workshop engineering tasks.
3. Apply fundamental automotive engineering knowledge to service engine, and driveline systems.
4. Check operation of, and perform minor repairs on, electrical and electronic systems
5. Apply fundamental automotive engineering knowledge to service steering, suspension and brake systems.

Employment Pathways

Graduates of this qualification will have the skills and knowledge to work in an entry level position in the automotive industry. This will lead to employment in the light vehicle, heavy vehicle, automotive electrical and motorcycle engineering industries.

Pathways to Further Study

Graduates may progress to level 4 qualifications in Automotive Engineering (Managed Apprenticeship) once they have obtained an apprenticeship.

Programme Outline

Content includes automotive workplace practices requirements, engine and ancillary systems fundamentals, fundamentals and servicing of vehicle electrical and electronic components and systems, fundamentals and servicing of entire transmission driveline, braking, suspension and steering systems

This is a 120-credit programme, divided into 10 compulsory courses.

Course Code	Course Title	Level	Credit	Compulsory or Elective	Pre / Co requisite
AE3150	Automotive Workshop Safety	3	10	Compulsory	Nil
AE3156	Basic Workshop Engineering Tasks, Tools and Equipment	3	15	Compulsory	Nil
AE3157	Engines	3	15	Compulsory	Nil
AE3151	Engine Systems	3	10	Compulsory	Nil
AE3152	Driveline systems	3	10	Compulsory	Nil
AE3158	Electrical and Electronics	3	15	Compulsory	Nil
AE3153	Starting and Charging Systems	3	10	Compulsory	Nil
AE3154	Electronic Controls, High Voltage Systems and HVAC	3	10	Compulsory	Nil
AE3160	Brake Systems	3	15	Compulsory	Nil
AE3161	Steering and Suspension Systems	3	10	Compulsory	Nil

Automotive Workshop Safety
Health and safety policies, procedures and regulations that ensure consistent safe, and effective working practices in the automotive industry.

Basic Workshop Engineering Tasks, Tools and Equipment
Performing a range of engineering tasks, within an automotive workshop.

Engines
Disassembling and identifying engine components and carrying out engine tuning.

Engine Systems
Functions and purpose of engine system and carrying out basic tuning.

Driveline Systems
Functions, and purpose of driveline system, and carrying out basic servicing.

Electrical and Electronics
Automotive electrical principles and performing basic electrical tasks.

Starting and Charging Systems
Automotive starting and charging principles and performing operation checks.

Electronic Controls, High Voltage Systems and HVAC
Functions and purpose of electronic control systems, understanding safety of high voltage systems.

Brake Systems
Functions, purpose, location and servicing of brake systems.

Steering and Suspension Systems
Functions, purpose, location and servicing of suspension systems.

Timetable

This programme is taught over 3 days (which will be confirmed after you enrol), 8am-4pm face to face each day.

Progress Through the Programme

This programme is completed in one-year, full time.

Award of Qualification

Students must successfully complete all 10 courses to be awarded the New Zealand Certificate in Automotive Engineering (Level 3).

Teaching and Learning Methods

The programme is to be delivered in an integrated manner and may include tasks in the following settings: workshop, lecture, seminar, online, video, tutorial, self-directed learning, individual work, group work, simulated industry workplace tasks.

The programme will help create, maintain and evolve an environment which fosters active learning, broad thinking, integrity and respectful engagement all of which are valuable within the industry and across the community.

Formative assessment will be used to support learning throughout the course to provide students with regular, prompt, and constructive feedback.

Evaluations will also be used in ensuring delivery meets students' needs.

All aspects of the curriculum will conform to the requirements of the provider.

This will ensure students have the opportunity to develop graduate attributes in preparation for employment, further study and participation in society.

Language, literacy, and numeracy will be fully embedded to demonstrate a mature stage of ELN practice, where ELN is part of general everyday learning and teaching (Ministry of Education, 2014). This means that existing literacy and numeracy resources, such as the learning progressions framework, are used and the development of learners' literacy and numeracy skills are embedded throughout the programme.

Assessment

The programme uses competency–based assessment.

All assessments will be aligned to the level of the programme in terms of the literacy and numeracy required and recognises the literacy and numeracy of the learners. This will help to ensure that the language of the assessment does not become a barrier to learners achieving the measurable `vocational and content specific outcomes of the programme.

Assessment methods include: Portfolio, exam, test, assignment, written assessment, practical

Portfolio of achievement

Portfolios may be defined as "a collection of physical evidence of learning and achievements". Portfolios gather all of the learning into one place and enable them to present examples and evidence of their work in a coherent way for both assessors and potential employers. Portfolios are employed throughout the programme in a number of courses. The intention of the Portfolio is for all students to:

- Record examples of their learning process associated with course materials. These entries may be made available for feedback (also known as formative assessment which does not contribute to grading and marks).
- To record and make available evidence for assessments to demonstrate meeting specific course learning outcomes (summative assessments).
- Personal development or planning (used for certification or registration and usually involves a review process, action plan, and recognition of required professional criteria).
- Present or showcase their developing and 'best' work and accomplishments either during study or on work placement.

Portfolio assessment

Assessment for this programme will be project, portfolio based and where possible based on naturally occurring activities. Students may assemble a portfolio of evidence that demonstrates their knowledge and skills. The portfolio may include a range of assessment activities including:

- Tutor observations and attestations of safe working practices, and skills while students undertake project work
- Student generated evidence of, and comments on, assessment activities completed as part of assigned projects
- Tutor led assessment/s for underpinning knowledge
- Assignments
- Self-directed activities

Written examinations or tests

Written examinations or tests may be closed or open-book and are a measure of learning within a controlled environment. Tests are normally completed during a course to ensure that students are assimilating material as the course progresses. Tests and examinations may include, short answer, multiple choice and/or essay questions.

Practice assessments

These may include simulation of real-life scenarios, demonstration of practical skills and role-playing. Outcomes of practice tasks will be measured against standards that are clearly laid out. Assessment may involve tutor, self, or peer participation. Evidence of achievement will be noted into the students' portfolio of achievement.

Peer and self-assessments

Many tasks may lend themselves to peer and/or self-assessment. Peer- and self-assessment reflect both the contexts in which graduating students will work and the practices of working independently and in collaborative teams. They promote the development of reflection and critique and, where employed, will be carried out with agreed and explicit criteria.

Personal Responsibility

We are committed to providing a safe and positive learning and working environment for all students, so everyone can meet their learning goals. You can expect to be treated with fairness, dignity and respect by staff and other students. For further information on what we will provide and what is expected of you as a student please click here

Course Outlines

Code	**Title**	
AE3150	Automotive Workshop Safety	
Level	**Credits**	**Pre-requisites**
3	10	Nil
Learning hours	tutor-directed 64	self-directed 36

Aim

In this course students will identify and consistently apply policies, procedures and regulations that ensure safe and effective working practices when undertaking work in an automotive workshop.

Learning outcomes

By the end of this course the student will be able to:

1. Identify the policies, procedures and regulations that underpin safe workshop practices.
2. Select and consistently apply safe and effective working practices when undertaking work in an automotive workshop.

Content

Policies and Procedures

- Working safely within company policies including security requirements
- Manufacturer's procedures
- Awareness of environmental regulations

Safe and effective practice

- Maintaining a tidy work environment
- Cleaning and storing tools/machines/vehicles appropriately
- Computer literacy relevant to an automotive setting
- Customer care and service

Assessments

A portfolio of evidence that demonstrates attainment of competence in each assessed focus area is required	
Assessment Method	**Learning Outcomes**
Practical Theory assignment	LO1, 2

Successful completion of course

Students must successfully complete and pass all assessment activities within the portfolio in order to pass and receive credit for this course.

Code	**Title**	
AE3156	Basic Workshop Engineering Tasks, Tools and Equipment	
Level	**Credits**	**Pre-requisites**
3	15	Nil
Learning hours	tutor-directed 96	self-directed 54

Aim

In this course students will use hand and power tools and workshop engineering equipment to complete basic automotive engineering workshop tasks.

Learning outcomes

By the end of this course the student will be able to:

1. Explain tools, power tools and engineering equipment in an automotive engineering workshop.
2. Use hand and power tools to complete basic automotive engineering workshop tasks.
3. Use workshop engineering equipment to complete basic automotive engineering workshop tasks.

Content

Underpinning principles

- Metal types and properties
- ISO symbols
- Principles behind basic fabrication techniques
- Principles behind use of specialist tools

Hand and power tools and procedures

- Basic hand and power tools
- Procedures guiding use of basic hand and power tools
- Specialist tools (torque wrenches, precision measuring tools)

Workshop engineering equipment

- Metal types/properties which may include castings
- ISO symbols
- Basic fabrication (heating, cutting, welding, threading, fastening systems)

Assessments

A portfolio of evidence that demonstrates attainment of competence in each assessed focus area is required	
Assessment Method	**Learning Outcomes**
Practical Theory assignment	LO1, 2, 3

Successful completion of course

Students must successfully complete and pass all assessment activities within the portfolio in order to pass and receive credit for this course.

Code	**Title**	
AE3157	Engines	
Level	**Credits**	**Pre-requisites**
3	15	Nil
Learning hours	tutor-directed 96	self-directed 54

Aim

In this course students will identify the components of an engine; strip, measure and reassemble and start an engine as well as carry out tuning for four stroke petrol and diesel engines.

Learning outcomes

By the end of this course the student will be able to:

1. Identify the components of an engine.
2. Disassemble, measure, reassemble and start an engine.
3. Carry out engine tuning for four stroke petrol and diesel engines

Content

Engine Components

- Petrol and Diesel engines
- Cubic capacity measurement

Disassemble, measure, reassemble and start

- Four stroke diesel OR petrol engine
- Cleaning
- Lubrication, lubricants and sealants

Engine tuning

- Making adjustments
- Tuning of four stroke petrol and diesel engines

Assessments

A portfolio of evidence that demonstrates attainment of competence in each assessed focus area is required	
Assessment Method	**Learning Outcomes**
Practical Theory assignment	LO1, 2, 3

Successful completion of course

Students must successfully complete and pass all assessment activities within the portfolio in order to pass and receive credit for this course.

Code	**Title**	
AE3151	Engine Systems	
Level	**Credits**	**Pre-requisites**
3	10	Nil
Learning hours	tutor-directed 64	self-directed 36

Aim

In this course students will describe the function, purpose and location of engine systems and undertake basic servicing of engine systems.

Learning outcomes

By the end of this course the student will be able to:

1. Describe the function, purpose and location of engine systems.
2. Undertake basic servicing of engine systems.

Content

Engine systems

- Intake
- Cooling including temperature and pressure
- Engine Management System
- Exhaust systems (emissions knowledge of)
- Fuel, petrol and diesel (mechanical and electronic)

Servicing

- Intake
- Cooling
- Engine Management System
- Exhaust systems (emissions knowledge of)
- Fuel, petrol and diesel (mechanical and electronic)

Assessments

A portfolio of evidence that demonstrates attainment of competence in each assessed focus area is required	
Assessment Method	**Learning Outcomes**
Practical Theory assignment	LO1, 2

Successful completion of course

Students must successfully complete and pass all assessment activities within the portfolio in order to pass and receive credit for this course.

Code	**Title**	
AE3152	Driveline Systems	
Level	**Credits**	**Pre-requisites**
3	10	Nil
Learning hours	tutor-directed 64	self-directed 36

Aim

In this course students will describe the function, purpose and location of driveline systems and undertake basic servicing of driveline systems.

Learning outcomes

By the end of this course the student will be able to:

1. Describe the function, purpose and location of driveline systems.
2. Undertake basic servicing of driveline systems.

Content

Function, purpose and location

- Clutch
- Transmission
- Driveline

Service of driveline systems (as required)

- Clutches (knowledge of)
- Transmissions
- Final drives

Assessments

A portfolio of evidence that demonstrates attainment of competence in each assessed focus area is required	
Assessment Method	**Learning Outcomes**
Practical Theory assignment	LO1, 2

Successful completion of course

Students must successfully complete and pass all assessment activities within the portfolio in order to pass and receive credit for this course.

Code	**Title**	
AE3158	Electrical and Electronics	
Level	**Credits**	**Pre-requisites**
3	15	Nil
Learning hours	tutor-directed 96	self-directed 54

Aim

In this course students will understand and identify automotive electrical and electronic principles as well as carry out basic checks and repairs on wiring and lighting systems.

Learning outcomes

By the end of this course the student will be able to:

1. Understand and identify automotive electrical and electronic principles.
2. Identify and describe automotive electronic purpose and principles.
3. Use appropriate tools to test batteries and test and repair wiring and lighting systems.

Content

Electrical and electronic function and purpose

- Recognised industry symbols
- Electrical principles
- Electromagnetism / electromagnetic induction
- Electrical component diagrams
- Electronic components and circuits
- OHMS's Law

Battery, wiring and lighting systems

- Purpose and operations:
- Batteries – identify and test
- Design and construct wiring and lighting circuits
- Basic checks and repairs
- Soldering

Assessments

A portfolio of evidence that demonstrates attainment of competence in each assessed focus area is required	
Assessment Method	**Learning Outcomes**
Practical Theory assignment	LO1, 2, 3

Successful completion of course

Students must successfully complete and pass all assessment activities within the portfolio in order to pass and receive credit for this course.

Code	**Title**	
AE3153	Starting and Charging Systems	
Level	**Credits**	**Pre-requisites**
3	10	Nil
Learning hours	tutor-directed 64	self-directed 36

Aim

In this course, students will identify the function and purpose of starting, charging and ignition systems as well as use appropriate tools and processes to check the operation of starting, charging and ignition systems.

Learning outcomes

By the end of this course the student will be able to:

1. Identify the function and purpose of starting, charging systems.
2. Use appropriate tools and processes to check the operation of starting, charging systems.

Content

Function and purpose

- Alternators
- Starter motors
- Associated wiring systems
- Starting and charging systems
- Ignition Systems

Tools and processes

- Starting and charging systems
- Test and checks
- Correct tools

Assessments

A portfolio of evidence that demonstrates attainment of competence in each assessed focus area is required	
Assessment Method	**Learning Outcomes**
Practical Theory assignment	LO1, 2

Successful completion of course

Students must successfully complete and pass all assessment activities within the portfolio in order to pass and receive credit for this course.

Code	Title	
AE3154	Electronic Controls, High Voltage Systems and HVAC	
Level	**Credits**	**Pre-requisites**
3	10	Nil
Learning hours	tutor-directed 64	self-directed 36

Aim

In this course students will understand the function and purpose of control systems, use appropriate tools and processes to check the operation of electronic control systems as well as understand the operation and safety processes of high voltage systems.

Learning outcomes

By the end of this course the student will be able to:

1. Understand the function and purpose of electronic control systems.
2. Use appropriate tools and processes to check the operation of electronic control systems.
3. Understand operation and safety processes of high voltage (HV) systems.

Content

Function and purpose

- control units
- communication networks
- HVAC
- Occupant protection
- Sensors and actuators

Tools and processes

- control units
- communication networks
- HVAC
- Occupant protection
- Sensors and actuators

Safety and operation of HV

- Hybrid or Electric Vehicle (EV)
- Safety operations

Assessments

A portfolio of evidence that demonstrates attainment of competence in each assessed focus area is required	
Assessment Method	**Learning Outcomes**
Practical Theory assignment	LO1, 2, 3

Successful completion of course

Students must successfully complete and pass all assessment activities within the portfolio in order to pass and receive credit for this course.

Code	Title	
AE3160	Brake Systems	
Level	**Credits**	**Pre-requisites**
3	15	Nil
Learning hours	tutor-directed 96	self-directed 54

Aim

In this course students will identify the function, purpose and location brake systems and use appropriate tools and processes to service brake systems.

Learning outcomes

By the end of this course the student will be able to:

1. Identify the function, purpose and location of brake systems and their respective components.
2. Use appropriate tools and processes to service brake systems.
3. Understand the function and purpose of wheels and tyres.

Content

Brake systems

- Function
- Purpose
- Location
- Respective components

Tools and processes

- Replacement of consumables
- Replacement of components
- Making adjustments

Wheels and tyres

- Function
- Purposes
- Remove and refit

Assessments

A portfolio of evidence that demonstrates attainment of competence in each assessed focus area is required	
Assessment Method	**Learning Outcomes**
Practical Theory assignment	LO1, 2, 3

Successful completion of course

Students must successfully complete and pass all assessment activities within the portfolio in order to pass and receive credit for this course.

Code	Title	
AE3161	Steering and Suspension Systems	
Level	**Credits**	**Pre-requisites**
3	10	Nil
Learning hours	tutor-directed 64	self-directed 36

Aim

In this course students will identify the function, purpose and location of steering and suspension systems and use appropriate tools and processes to service steering and suspension systems.

Learning outcomes

By the end of this course the student will be able to:

1. Identify the function, purpose and location of steering systems and their respective components.
2. Identify the function, purpose and location of suspension systems and their respective components.
3. Use appropriate tools and processes to service steering and suspension systems.

Content

Steering systems

- Function
- Purpose
- Location
- Respective components

Suspension systems

- Function
- Purpose
- Location
- Respective components

Tools and processes

- Replacement of consumables
- Replacement of components
- Making adjustments

Assessments

A portfolio of evidence that demonstrates attainment of competence in each assessed focus area is required	
Assessment Method	**Learning Outcomes**
Practical Theory assignment	LO1, 2, 3

Successful completion of course

Students must successfully complete and pass all assessment activities within the portfolio in order to pass and receive credit for this course.