School of Construction and Engineering Trades

NZ4316

New Zealand Certificate in Electrical Pre-Trade (Level 3)

Student Handbook

NZ Certificate in Electrical Pre-Trade (Level 3)

Available on the Programme site on Moodle

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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

Richard Davies (Programme Manager)

Matt Allen
Tony Dellabarca
Justin Graham
Mary Graham
Evan Green
Mark Hollis
Alan Lee
Graham Paine
Owen Vambe
Hennie Vermeulen

Resources

Students to Supply/bring:

- Paper (refill and folder or exercise book)
- Pens (4 coloured pen or a blue, black, red, and green)
- Pencil
- Ruler
- Scientific Calculator

Programme Aim

The aim of this programme is to provide learners with introductory knowledge and basic practical skills for the electrical industry. It is suitable for learners who wish to undertake further training or entry-level employment in the electrical industry and related electrical fields but do not yet have an apprenticeship agreement.

Graduate Outcomes

Graduate Profile

Graduates will be able to:

- Apply knowledge and principles of electrical theory and practice to basic electrical tasks
- Apply safe working procedures and practices to electrical tasks, including first aid and CPR as needed
- Operate within legal limitations of electrical and relevant non-electrical legislation
- Select and use products, tools, and equipment suitable for use in the electrical industry
- Install cables and electrical equipment
- Use testing techniques to test for electrical safety, and to identify and diagnose electrical faults
- Demonstrate behaviours suitable for the workplace, follow instructions, and complete basic workplace documentation

Employment Pathways

Graduates will be able to enter an electrical apprenticeship as a first-year apprentice. Graduates may be employed in entry-level positions in trades relevant to the Electrical Workers Registration Board (EWRB) registration classes, other electrical fields such as switchgear fitting, electronics, electricity supply industry, manufacturing, electrical wholesaling or retailing.

Pathways to Further Study

Graduates may progress to:

- New Zealand Certificate in Electrical Engineering (Theory and Practice Trade) (Level 4) [Ref: 2388]
- New Zealand Certificate in Electrical Trade (Level 4) with strands in General Electrical, and Electricity Supply [Ref: 4204]
- and/or higher-level qualifications in other electrical fields.

Programme Outline

Content

The New Zealand Certificate in Electrical Pre-Trade (Level 3) is designed to meet legislative and regulatory requirements, codes of practice, and industry best practice. The programme is comprised of eight 15 credit compulsory courses at level 3, each of which are designed to meet the requirements of the qualification graduate profile. To achieve the qualification, learners/ākonga must successfully complete all eight courses within the programme and achieve a pass grade in a final closed-book examination (capstone assessment) which is designed to measure their understanding and competency gained towards the end of the qualification. This examination is additional to the standard course requirements of the programme and is set and moderated by the Standard Setting Body (or Workforce Development Council) to prepare trainees for further training and leading to relevant EWRB registration classes.
The coherence of a learner's journey through this programme is not affected by the order of courses, however the capstone examination may only occur once a learner/ākonga has successfully completed all other formal courses.

The programme is designed to equip learners/ākonga with the underpinning electrical knowledge and basic practical skills to enter further training or entry-level employment, such as an apprenticeship, within the electrical industry and related electrical fields.

Course Code	Course Title	Level	Credit	Compulsory or Elective	Pre / Co requisite
EE3111	Electrical Work Practices	3	15	C	
EE3112	DC Fundamentals	3	15	C	
EE3113	AC Fundamentals	3	15	C	
EE3114	Cables, Fittings and Testing	3	15	C	
EE3115	Supply Systems	3	15	C	EE3001
EE3116	Protection, Plans and Circuits	3	15	C	EE3001
EE3117	Electrical Installations	3	15	C	EE3001
EE3118	Electrical Machines, Transformers, and Isolation	3	15	C	EE3001
EE3119	Capstone Assessment*	3	1	C	

Content includes electrical workplace practice requirements, DC and AC fundamentals, electrical installation fundamentals, electricity supply and distribution, circuit design and operation, health and safety and electrical machines.

In this course learners/ākonga will apply fundamental theory and principles of magnetism and electromagnetism and demonstrate the safe use of the tools and equipment used in an electrical workplace.

Electrical Work Practices

This course introduces electrical workplace standards and health and safety practices. Learners/ākonga will achieve/maintain a first aid certificate.

DC Fundamentals

In this course learners/ākonga will learn to apply fundamental theory and principles of Direct Current (DC) circuits and systems.

AC Fundamentals

In this course learners/ākonga will apply fundamental theory and principles of magnetism and electromagnetism and demonstrate the safe use of the tools and equipment used in an electrical workplace

Cables, Fittings and Testing

In this course learners/ākonga will install, test and fault-find electrical cords, cables, and equipment in accordance with legislation.

Supply Systems

This course introduces learners/ākonga to the New Zealand electricity supply system and methods used to ensure the protection of users and installations.

Protection, Plans and Circuits

This course introduces learners/ākonga to circuit protection, electrical drawing conventions, switching circuits and lighting.

Electrical Installations

In this course learners/ākonga will apply knowledge of cable and wiring systems including damp situations and special installations.

Electrical Machines, Transformers, and Isolation

This course introduces theories underpinning the operation of transformers, electrical machines, and isolation procedures.

Capstone Assessment

Learners/ākonga will demonstrate the knowledge of theory and practice for electrical workers in accordance with EWRB final closed-book examination (capstone assessment).

Timetable

The course runs over 3 days between Monday - Thursday

Progress Through the Programme

This programme is completed in one year of study, full time or two years of study, part time.

Learners/ākonga are expected to complete this programme within two years of first enrolment (full time) or four years of study (part time).

Award of Qualification

Learners/ākonga must successfully complete all eight compulsory courses and achieve a minimum of 60% in the capstone course to be awarded NZ4316 New Zealand Certificate in Electrical Pre-Trade (Level 3).

Teaching and Learning Methods

Tutorials, simulated work-based learning, group work, case studies, project activities, online learning activities

Assessment

The grade method is GM1. To pass each course, learners/ākonga must pass all assessments.

Further assessment is conducted within the Academic Statute – section 4 Regulations. This programme limits further attempts to one per assessment. Learners/ākonga may apply for a reassessment for a failed course if they gained a mark of 45% or more in that course. There is no provision for late submission/extension of the final examination.

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**
EE3111	Electrical Work Practices
Level	**Credits**
3	15
Learning hours	tutor-directed **97.5** self-directed **52.5**

Aim

Learners/ākonga will be able to apply electrical workplace standards and health and safety practices. They will also achieve/maintain a first aid certificate.

Learning outcomes

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

1. Select and apply first aid practices and CPR suitable for the electrical trade. (2 credits)
2. Identify workplace dangers and hazards and apply their controls in accordance with the current Health and Safety at Work legislation. (9 credits).
3. Describe workplace ethics and cultural competence in the electrical context. (1 credit)
4. Describe safe working practices in accordance with of the legislative requirements for working safely in the electrical industry. (2 credits)
5. Describe the scope of electrical industry Acts, Regulations, Standards, Codes, and industry governance bodies. (1 credit)

Content

- First Aid and CPR for the electrical workplace
- Rescuing persons in contact with electricity
- Hazards within the electrical workplace
- Workplace health and safety procedures
- Professional standards expected of electrical workers
- Electrical Health & Safety practices and procedures
- Legislation, standards, and codes of practice governing electrical workers

Essential Capabilities for Electrical Registration (ECs)

- Successful completion of this course will confirm performance capabilities, in part or full of the following ECs 1, 2, 3, 4, 5, 8, 39, 43.

Electrical Appliance Serviceperson (endorsed to disconnect and connect) [EASQ]

- Successful completion of this course will confirm performance capabilities in the following EASQ practical skills: 1, 18.

Assessments

Assessment Method	**Learning Outcome/s**
Theory and practical assessments	1, 2, 3, 4
Theory assessment	5

Successful completion of course

Learners/ākonga must pass all assessments to be competent in this course

Code	**Title**
EE3112	DC Fundamentals
Level	**Credits**
3	15
Learning hours	tutor-directed **97.5** self-directed **52.5**

Aim

Learners/ākonga will apply fundamental theory and principles of Direct Current (DC) circuits and systems

Learning outcomes

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

1. Apply mathematical principles to electrical contexts (3 credits).
2. Explain the nature of conductors, insulators, voltage, current and resistance (4 credits).
3. Apply the theories of the relationships between electrical quantities (4 credits).
4. Apply knowledge of fundamental electrical theory to configure and test a variety of DC circuits (4 credits).

Content

- Transposition of formula associated with electrical quantities
- Electrical terms, units and conventions
- Fundamental electrical laws
- EMF production methods
- The nature of conductors and insulators
- Resistance and resistors, series and parallel circuits
- Designing and calculating values of DC circuits
- Circuit testing techniques

Essential Capabilities for Electrical Registration (ECs)

Successful completion of this course will confirm performance in part or full of the following ECs 6, 7, 8, 9, 22.

Assessments

Assessment Method	Learning Outcome/s
Theory and practical assessments	2
Theory assessment	1,3,4

Successful completion of course

Learners/ākonga must pass all assessments to be competent in this course

Code	Title
EE3113	AC Fundamentals
Level	**Credits**
3	15
Learning hours	tutor-directed **97.5** self-directed **52.5**

Aim

Learners/ākonga will apply fundamental theory and principles of magnetism and electromagnetism and demonstrate the safe use of the tools and equipment used in an electrical workplace.

Learning outcomes

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

1. Safely isolate AC circuits (4 credits).
2. Select, maintain and safely use tools and associated equipment (5 credits)
3. Explain the principles of magnetism and electromagnetism (2 credits).
4. Explain the principles of AC generation (4 credits)

Content

- Hand and power tools used in the electrical industry
- Electrical test equipment
- Testing for isolation and electrical safety in accordance with current legislation
- Magnetism and electromagnetism principles
- Electromagnetically operated equipment
- Differences between DC and AC
- AC generation principles, terms and units
- Calculations involving AC

Essential Capabilities for Electrical Registration (ECs)

Successful completion of this course will confirm performance capabilities, in part or full of the following ECs: 2, 22.

Electrical Appliance Serviceperson (endorsed to disconnect and connect) [EASQ]

Successful completion of this course will confirm performance capabilities in the following EASQ practical skills: 2, 11, 12, 13.

Assessments

Assessment Method	Learning Outcome/s
Theory and practical assessments	1, 2
Theory assessment	3,4

Successful completion of course

Learners/ākonga must pass all assessments to be competent in this course

Code	Title
EE3114	Cables, Fittings and Testing
Level	**Credits**
3	15
Learning hours	tutor-directed **97.5** self-directed **52.5**

Aim

Learners/ākonga will install, test and fault-find electrical cords, cables, and equipment in accordance with legislation.

Learning outcomes

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

1. Select and install electrical cords and cables for a variety of applications. (5 credits)
2. Select and install common electrical fittings for a variety of applications. (5 credits)
3. Describe and diagnose common electrical faults. (5 credits)

Content

- Electrical cords and cable types, identification and specifications
- Cord and cable installation procedures and practices
- Electrical fittings identification and specifications
- Electrical fittings installation procedures and practices for diverse situations
- Diagnosing common electrical faults
- Using test equipment to fault find and test various electrical installations
- Legislative requirements testing installations

Essential Capabilities for Electrical Registration (ECs)

Successful completion of this course will confirm performance capabilities, in part or full of the following ECs 3, 19, 27, 37, 15, 16, 28, 29, 36.

Electrical Appliance Serviceperson (endorsed to disconnect and connect) [EASQ]

Successful completion of this course will confirm performance capabilities in the following EASQ practical skills: 3, 5, 10, 11 14, 15.

Assessments

Assessment Method	Learning Outcome/s
Theory and practical assessments	1, 2,3
Theory assessment	3

Successful completion of course

Learners/ākonga must pass all assessments to be competent in this course

Code	Title
EE3115	Supply Systems
Level	**Credits**
3	15
Learning hours	tutor-directed **97.5** self-directed **52.5**

Aim

Learners/ākonga will apply knowledge of the New Zealand electricity supply system and methods used to ensure the protection of users and installations.

Learning outcomes

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

1. Outline the principles of New Zealand's electricity generation, transmission and distribution system. (3 credits)
2. Identify the legislative and safe working requirements associated with high voltage areas (3 credits).
3. Outline the principles, installation and testing of earthing and equipotential bonding (4 credits).
4. Explain the principles, configuration and components of the Multiple Earthed Neutral (MEN), Separated Extra Low Voltage (SELV) and Protective Extra Low Voltage (PELV) systems (4 credits).

Content

- The NZ national electrical generation, transmission, and distribution system.
- Star and Delta multiphase connections
- Working safely in the vicinity of high voltage
- Earthing and equipotential bonding components, testing and legislation
- MEN, SELV and PELV systems
- Grid-tied and Stand-alone power supply safety
- UPS, Gen-sets and backup battery bank safety
- The dangers associated with testing alternative energy sources

Essential Capabilities for Electrical Registration (ECs)

Successful completion of this course will confirm performance in part or full of the following ECs 3, 12, 14, 24, 31, 32, 43.

Assessments

Assessment Method	Learning Outcome/s
Theory assessment	1,2,3,4

Successful completion of course

Learners/ākonga must pass all assessments to be competent in this course

Code	Title
EE3116	Protection, Plans and Circuits
Level	**Credits**
3	15
Learning hours	tutor-directed **97.5** self-directed **52.5**

Aim

Learners/ākonga will apply knowledge of circuit protection, electrical drawing conventions, switching circuits and lighting.

Learning outcomes

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

1. Explain the principles and operation of circuit protection components and systems (3 credits)
2. Select and install circuit protection components in accordance with current legislation (3 credits).
3. Produce a variety of electrical drawings. (3 credits).
4. Design and construct power switching circuits (3 credits).
5. Outline the operating principles, design and installation requirements of a variety of lighting systems (3 credits)

Content

- Construction, operation, ratings and applications of common circuit protection devices.
- RCD classifications, ratings and applications.
- Installation of fuse element replacements.
- Selection and installation of common circuit protection devices.
- Protection in hazardous areas.
- Electrical drawing conventions and symbols
- Power switching circuits
- Lighting systems

Essential Capabilities for Electrical Registration (ECs)

Successful completion of this course will confirm performance in part or full of the following ECs 3, 27, 30, 44, 45.

Electrical Appliance Serviceperson (endorsed to disconnect and connect) [EASQ]

Successful completion of this course will confirm performance capabilities in the following EASQ practical skills: 1, 4, 7, 8, 9.

Assessments

Assessment Method	**Learning Outcome/s**
Theory and practical assessments	1, 5
Theory assessment	2, 3, 4

Successful completion of course

Learners/ākonga must pass all assessments to be competent in this course

Code	**Title**
EE3117	Electrical Installations
Level	**Credits**
3	15
Learning hours	tutor-directed **97.5** self-directed **52.5**

Aim

Learners/ākonga will apply knowledge of cable and wiring systems including damp situations and special installations.

Learning outcomes

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

1. Identify practices required for working safely in damp situations (3 credits).
2. Install and terminate cables and flexible cords for common uses (3 credits).
3. Select and install a variety of cable support systems (3 credits).
4. Explain the operation of and use electronic components commonly used in the electrical trade (4 credits)
5. Apply basic soldering techniques to a range of applications (2 credits).

Content

- Damp situations and zones
- IP ratings
- Legislative requirements for cables and cords
- Cable routing, handling and installation methods
- Termination requirements and methods including crimp lugs, terminal posts and screw terminals.
- Cable support systems
- Fire barrier regulations for cable penetration points
- Electronic components and circuits.
- Soldering safety and techniques

Essential Capabilities for Electrical Registration (ECs)

Successful completion of this course will confirm performance capabilities, in part or full of the following ECs 3, 10, 16, 17, 18, 19, 20, 21, 22, 36, 37, 42.

Electrical Appliance Serviceperson (endorsed to disconnect and connect) [EASQ]
Successful completion of this course will confirm performance capabilities in the following EASQ practical skills: 5, 6, 17, 19.

Assessments

Assessment Method	**Learning Outcome/s**
Theory assessment	1
Practical assessments	2, 3, 5
Theory and practical assessments	4

Successful completion of course

Learners/ākonga must pass all assessments to be competent in this course

Code	**Title**
EE3118	Electrical Machines, Transformers and Isolation
Level	**Credits**
3	15
Learning hours	tutor-directed **97.5** self-directed **52.5**

Aim

Learners/ākonga will be able to demonstrate knowledge of theories underpinning the operation of transformers, electrical machines, and isolation procedures.

Learning outcomes

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

1. Explain the operation and use of capacitance and inductance as it relates to single phase motors (3 credits).
2. Explain the construction and operation of single-phase transformers (3 credits).
3. Install and run single-phase AC induction motors (4 credits).
4. Document and describe isolation and recommissioning procedures for electrical machinery fittings and equipment (5 credits).

Content

- The effect of inductance and capacitance in an AC circuit.
- Construction, operation, safe handling and legislative requirements for capacitors.
- Power factor and power factor correction requirements associated with AC motors.
- Construction, operation and applications of common single-phase transformers.
- DOL motor starting
- Components, construction and operation of various single-phase induction motors.
- Isolating and recommissioning electrical machines, equipment and installations.
- Workplace documentation.

Essential Capabilities for Electrical Registration (ECs)

Successful completion of this course will confirm performance in part or full of the following ECs 2, 3, 10, 11, 13, 14, 23, 25, 27, 34, 36, 38.

Electrical Appliance Serviceperson (endorsed to disconnect and connect) [EASQ]

Successful completion of this course will confirm performance capabilities in the following EASQ practical skills: 16.

Assessments

Assessment Method	**Learning Outcome/s**
Theory assessment	1,2
Practical assessments	3
Theory and practical assessments	4

Successful completion of course

Learners/ākonga must pass all assessments to be competent in this course

Code	**Title**	
EE3119	Capstone Assessment	
Level	**Credits**	
3	1	
Learning hours	tutor-directed **2**	self-directed **8**

Aim

Learners/ākonga will demonstrate the knowledge of theory and practice for electrical workers in accordance with EWRB final closed-book examination (capstone assessment).

Learners/ākonga will complete a final closed-book examination (Capstone Assessment) to measure their understanding and competency gained towards the end of the qualification.

This examination is set and moderated by the Standard Setting Body (or Workforce Development Council) to prepare trainees for further training and assessments leading to relevant EWRB registration classes.

Note: Achievement of this capstone assessment alone does not entitle trainees to legally perform prescribed electrical work without supervision. Until registered and licensed under the Electricity Act 1992, trainees are assisting, and must work under supervision when carrying out prescribed electrical work

Content

- A review of all the topics covered in modules 1-8 in the NZCEP programme.

Assessments

Assessment Method	**Grading**
Capstone Assessment: Closed-book examination (60% threshold)	Achieved/Not Achieved

Successful completion of course

Learners/ākonga must pass all assessments to be competent in this course

Learners/ākonga must achieve at least 60% in the final closed-book examination.

Learners are expected to attend the examination at the published time and place. Learners will be provided with full details of the examination dates, types, requirements, and all other relevant information at least eight weeks prior to the scheduled date of the examination.