Overview
This unit will provide all of the necessary underpinning knowledge of electrical science to enable learners to understand the natural and physical science behind electrical beauty therapy treatments.

Learning outcomes
On completion of this unit, learners will:

LO1 Understand the structure of matter
LO2 Understand electricity and the effects of an electric current
LO3 Understand natural and artificial electromagnetic radiation
Assessment requirements

Learners must complete **all** the assessment requirements related to this unit:

1. **External examination**
   The theory content of LO1, LO2 and LO3 will be tested by external examinations at the end of the period of learning.

   External examinations will test knowledge and understanding from across the whole vocational area (mandatory units). Learners should use the unit content section of this unit to aid revision since exam questions will test the full breadth of this section.

   External examinations will be set and marked by VTCT and will contribute to the overall qualification grade.

2. **Graded synoptic assessment**
   In the last term or final third of their qualification, learners will be required to undertake a graded synoptic assessment. This will require learners to carry out a range of services from across the whole vocational area (mandatory units). Assessment coverage will vary year on year, although all services will be covered over time.

   VTCT will set a brief for centres which will detail the services to be covered in the graded synoptic assessment. Grading descriptors for the synoptic assessment will also be provided by VTCT.

   The graded synoptic assessment will be marked and graded by centre staff and externally verified by VTCT.

   The graded synoptic assessment will contribute to the overall qualification grade.
Unit content

LO1 Understand the structure of matter

Learners must be able to understand and define:

- Natural and physical science
- Matter – anything that has mass and occupies space
- Substances – 3 different physical states – solid, liquid and gas
- Periodic table, elements, chemical symbols
- Atomic structure – electrons, protons, neutrons, nucleus
- A molecule – smallest part of a compound
- Compounds – fixed composition, chemical reactivity, ions: anion – negatively charged, cation – positively charged, covalent bonding, ionic bonding (electro-valent)
LO2 Understand electricity and the effects of an electric current

Learners must be able to define and understand the function of:

- Electricity/electric current – free flow of electrons
- Electricity – static and dynamic
- Alternating current – Hertz (Hz), mains electricity frequency of 50 Hz
- Direct current
- Polarity – + or –
- Rectifiers – diodes
- Capacitors
- Transformers
- Potentiometer
- Rheostat
- Starter – small cartridge located in fluorescent lights
- Oudin coil or resonator
- Conductors
- Insulators
- Electric circuits
- Electrical current strength – amperage, measured in units – amps or amperes, milli-amps
- Electrical pressure – voltage, measured in units – volts
- Electrical resistance – Ohms Law
- Electrical power – wattage, measured in units – watts, power of an appliance
- Fuses – protective device, cartridge fuse located in plugs, wire fuse/circuit breaker protect the wiring in a building
- Correct wiring in a mains plug
- Portable Appliance Testing (PAT)
- Electrodes – moving – metal (electrolysis needles or facial galvanic), glass (high frequency), static – carbon/graphite (body faradic or body galvanic pads)

Learners must be able to define the effects of an electric current:

- Friction
- Pressure
- Light
- Heat – infra-red lamp element, sauna stove
- Chemical action – electrolytes are good conductors, e.g. saline solution on the skin during neuro muscular stimulation or ionised gels/ampoules with chemical and physical effects during galvanic
- Magnetism – electromagnet – basis for mechanical massagers

Learners must be able to define and understand the effects of an electric current on face/body tissues:

- Types of electrical current used on the face
  - Galvanic – direct current, metal electrodes – cathode and anode, indifferent or active, cation, anion, anaphoresis, cataphoresis, ionic disassociation, polarity, sodium hydroxide (alkali), hydrochloric acid, desincrustation, saponification effect, iontophoresis, beneficial substances repelled into the skin
- High frequency – rapidly oscillating alternating current of high voltage low current, glass electrodes, oudin coil or resonator, saturator, argon or neon, ionisation of 02 to 03 (germicidal effect) producing an erythemic effect
- Faradic – interrupted direct current, carbon/graphite single pad, electrolyte – saline solution, biphasic polarity, stimulation to muscle fascia
- Micro-current – modified direct current, metal electrodes, shortens muscle fibres to improve muscle tone
- Thermolysis, high frequency, short-wave diathermy, radio frequency – oscillating, alternating current of high frequency, oscillator, friction of water molecules within hair follicle produces heat causing coagulation/desiccation effect
- Galvanic electrolysis – cathode (needle), anode, electrolyte (salt and water naturally occurring in tissue fluid), hydrogen gas, chlorine gas, sodium hydroxide (lye) has a chemical caustic effect within the hair follicle
- Blend – combination of both currents to treat distorted follicles

- Types of electrical current used on the body
  - Galvanic – direct current, carbon/graphite static pads – cathode and anode, indifferent or active, cation, anion, anaphoresis, cataphoresis, ionic disassociation, polarity, iontophoresis, beneficial substances repelled into the skin
  - High frequency – rapidly oscillating alternating current of high voltage low current, glass electrodes, saturator, ionisation of 02 to 03 (germicidal) effect
  - Faradic – interrupted direct current, carbon/graphite static pads, electrolyte – saline solution, monophasic or biphasic polarity, stimulation to muscle fascia
  - Micro-current – modified direct current, metal electrodes, shortens muscle fibres to lift and improve muscle tone
LO3 Understand natural and artificial electromagnetic radiation

**Learners must be able to define and understand:**
- Different types of electromagnetic radiation – gamma rays, x-rays, ultra-violet, visible light, infra-red, radio waves, nanometres
- Natural electromagnetic radiation spectrum, ultra-violet rays – UVA, UVB and UVC, frequencies, nanometres, penetration of different UV wavelengths to the skin
- Artificial electromagnetic radiation – infra-red, radiant heat, nanometres, wavelength, inverse square law – distance, cosine law – angle
- Ultra-violet radiation – mercury vapour lamps, wood lamp, sun bed

**Learners must understand the effects of electromagnetic radiation on the body tissue:**
- Infra-red – warming the epidermal tissues for therapeutic purposes, hyperaemia
- Radiant – deep heat effect to the dermis, vasodilation
- Ultra-violet – melanocyte activity to give a tanning response – four stages – erythema, thickening of epidermis, desquamation, pigmentation, vitamin D production, germicidal effect, hyperkeratinisation, psychological feeling of wellbeing

**Learners must understand the harmful effects of ultra-violet radiation on the body tissue:**
- Sunburn, skin cancer, premature ageing, dehydration, hyperpigmentation, hypopigmentation, allergic reactions, sun stroke, permanent eye damage
Resources

The special resources required for this unit are access to a real or realistic working environment which supports the provision of electrical face and body treatments.

Delivery guidance

Teachers are encouraged to use innovative, practical and engaging delivery methods to enhance the learning experience. Learners may benefit from:

- Meaningful employer engagement so they relate what is being learned to the real world of work and understand commercial competency and the use of products, tools and equipment
- Work experience within a commercial salon so they can practise to hone their skills in a real environment
- Using interactive information and technology, systems and hardware so they can learn about concepts and theories of electrical science and its practical applications

Links with other units

This unit is closely linked with the following units:

UCO28M Health and safety in the salon

The Health and safety unit will provide knowledge and understanding of the responsibilities for health and safety as defined by any specific legislation covering the role of the professional therapist. This unit greatly underpins all practical unit delivery.

Learners will be required to apply their knowledge and understanding of health and safety when preparing for and providing electrical therapy treatments in a real or realistic working environment.

UBT103M Facial electrical treatments

Knowledge of electrical science strongly underpins the practical skills and applications covered in the facial electrical unit. Learners will be required to apply their knowledge and understanding of electrical science when preparing for and providing electrical therapy treatments in a real or realistic working environment.

UBT104M Body electrical treatments

Knowledge of electrical science strongly underpins the practical skills and applications covered in the body electrical unit. Learners will be required to apply their knowledge and understanding of electrical science when preparing for and providing electrical therapy treatments in a real or realistic working environment.

Graded synoptic assessment

At the end of the qualification of which this unit forms part, there will be a graded synoptic assessment which will assess the learner’s ability to identify and use effectively in an integrated way an appropriate selection of skills, techniques, concepts, theories, and knowledge from a number of units from within the qualification. It is therefore necessary and important that units are delivered and assessed together and synoptically to prepare learners suitably for their final graded assessment.