1. Module details

Module name

Applied Physics Concepts 2

Module duration

It is expected that students with the appropriate entry knowledge and skills will successfully complete this module in 54-60 hours.

Module code

NUE092

Discipline code

2. Module purpose

This module is intended to develop learners understanding of some of the key ideas of physics, the characteristics of physics, and the ways in which physics asks questions about nature; and understanding of how the concepts of physics are used in selected applications; an ability to solve problems, using the ideas of physics; experimental skills including and understanding of experimental design and the analysis and interpretation of experimental data; the ability to obtain and evaluate physics-related information and data; and skills in the effective communication of the ideas of physics.

3. Prerequisites

NUE091 Applied Physics Concepts 1

4. Relationship to competency standards

This module partly supports the achievement of competency for units of competency in the National Electrotechnology Training Package Competency Standards, namely UTE NES058. Full competence is achieved through relevant off-job and on-job training as prescribed by the industry for the requisite qualification.

5. Content

1. Light and matter

Electromagnetic waves - characteristics of electromagnetic waves, speed/ frequency/ and wavelength, -*application: laser airborne depth sounder (LADS)*

The interference of light – coherent wave sources, interference, two-source interference, diffraction, two-slit interference, transmission diffraction gratings, speckle, – *application: compact discs*;

Photons – photons, the photoelectric effect, x-rays, - *application: the use of x-rays in medicine*;

Wave behaviour of particles – wave behaviour of particles, experimental evidence for wave behaviour of particles, - *application: electron microscopes*

2. Atoms and nuclei

The structure of the atom – line emission spectrum, energy

levels in atoms, spectrum of atomic hydrogen, ionisation energy, continuous spectrum, line absorption spectrum, fluorescence, stimulated emission, -*application: lasers*

The structure of the nucleus – composition of nuclei, the nucleon force, isotopes, mass defect and binding energy, conservation laws in nuclear reactions, -*application: the production of radioisotopes*

Radioactivity – stable and unstable nuclei, types of decay of unstable nuclei, alpha decay, beta minus decay, beta plus decay, half-life and activity, -*application: radioactive dating*, some properties of radioactive emissions, the effects of ionising radiation on living matter

Nuclear fission and fusion – spontaneous and induced nuclear fission, chain reaction, -*application: fission nuclear power*, nuclear fusion

3. Skills

Experimental skills – purpose and variables, procedure, observation, presentation, interpretation

Investigation design skills – designing and investigation, evaluating and investigation

Information skills – planning an information search, searching for information, evaluating information

Communication skills – oral communication, written communication, evaluation of oral and written communications

6. Assessment strategy

Assessment methods

Assessment should be progressive reflecting a holistic approach to ensure the module purpose is met and students are well prepared for work placement. To assist in ensuring validity, reliability and fairness assessment instruments should include practical exercises, assignments and written tests. Written tests should include, multiple choice, short answer and problem type items.

Conditions of assessment

Learning and assessment will take place in an environment that is conducive to a learner's development.

7. Learning outcome details

Learning outcome 1	
Assessment criteria	1.1
	1.2
	1.3
	1.4
	1.5
Learning outcome 2	
Assessment criteria	2.1
	2.2
	2.3
	2.4
	2.5

8. Delivery of the module

Delivery strategy	Delivery strategies must be suitable for both theoretical and practical learning and address the module purpose. It is recommended that learning and assessment be facilitated in a holistic manner, which may require a learning outcome sequence other than that indicated in the body of the module. Also an integrated theory/practice approach should be used where students learn by experimentation and though practical application.
Resource requirements	Resources should be sufficient for students to carry out exercises on an individual basis. Trainers/teachers/facilitators must have qualifications in the relevant subject area they are engaged to deliver recognised trainer and assessment training and at least five years relevant work experience. Useful references include: Class notes Physics reference books/manuals Vocational problems and applications to be derived from real

	workplace experiences using industry sources and/or personnel
Occupational health and safety requirements	A safe and healthy environment will be provided for students and teachers as well as safety procedure with regard to learning/teaching activity.