

ADVANCED DIPLOMA IN INDUSTRIAL PHYSICS

Qualification code: ADIP19 - NQF Level 7 (120 credits)

SAQA ID: 102065, CHE NUMBER: H16/E056CAN

Campus where offered:

Arcadia Campus

REMARKS

- a. *Admission requirement(s):*
A three-year Diploma/National Diploma in Industrial Physics (on NQF Level 6), **or** a three-year BSc degree with a physics major, **or** any three-year diploma/national diploma with a Physics major (on NQF Level 6). Applicants must have an average of at least 60% in their final-year modules.
- b. *Selection criteria:*
Admission is subject to selection. Qualifying applicants will be admitted based on their average final-year mark of their preceding qualification.
- c. *Minimum duration:*
One year.
- d. *Presentation:*
Day or evening classes (evening classes are offered over a period of two years).
- e. *Intake for the qualification:*
January only.
- f. *Exclusion and readmission:*
See Chapter 2 of Students' Rules and Regulations.
- g. *Recognition of Prior Learning (RPL), equivalence and status:*
See Chapter 30 of Students' Rules and Regulations.
- h. *Module credits:*
Module credits are shown in brackets after each module.

CURRICULUM

ATTENDANCE

CODE	MODULE	NQF-L	CREDIT
APA107V	Advanced Physics I (year module)	(7)	(24)
ELM117V	Electromagnetism (first-semester module)	(7)	(12)
IPA107V	Industrial Physics IV (year module)	(7)	(30)

plus three of the following modules in either Nuclear Technology or Photonics:

Nuclear Technology (ADIN19):

ANB117V	Accelerators and Nuclear Reactors I (second-semester module)	(7)	(12)
ORP107V	Occupational Radiation Protection I (year module)	(7)	(18)
RPD107V	Radiometry Protection Dosimetry I (year module)	(7)	(24)



Photonics (ADIO19):

LFO107V	Laser and Fibre Optics I (year module)	(7)	(24)
OPD107V	Optical Design I (year module)	(7)	(18)
RPB117V	Radiometry and Photometry (second-semester module)	(7)	(12)

TOTAL CREDITS FOR THE QUALIFICATION: **120**

MODULE INFORMATION (OVERVIEW OF SYLLABUS)

The syllabus content is subject to change to accommodate industry changes. Please note that a more detailed syllabus is available at the Department or in the study guide that is applicable to a particular module. On 01 August 2018, the syllabus content was defined as follows:

A

ACCELERATORS AND NUCLEAR REACTORS I (ANB117V) 1 X 3-HOUR PAPER (Module custodian: Department of Physics)

Accelerator ion sources; accelerator technologies; applications of accelerators; nuclear reactor physics; nuclear power reactors; applications of research reactors. (Total tuition time: ± 120 hours)

ADVANCED PHYSICS I (APA107V) 2 X 3-HOUR PAPERS (Module custodian: Department of Physics)

Part A (paper I): Solid State and Quantum Mechanics - Crystallography; Electron theory of solids; Semiconductor device theory; Wave-particle duality; Schrodinger wave equation: wave function, interpretation, standard solutions, tunnelling and first order time independent perturbation theory. Part B (paper II): Thermodynamics and Statistical Mechanics - Ideal and real gases; First, Second and Third laws of thermodynamics; Thermodynamic potentials: Legendre transformations, Maxwell relations; Classical statistical thermodynamics: ensembles, Maxwell-Boltzmann statistics; Quantum statistical physics: Bose-Einstein and Fermi-Dirac statistics. (Total tuition time: ± 240 hours)

E

ELECTROMAGNETISM (ELM117V) 1 X 3-HOUR PAPER (Module custodian: Department of Physics)

Vector analysis; electrostatics and magnetostatics; sources of magnetic fields; electrodynamics; Maxwell's equations and applications: Gauss', Ampere's and Faraday's Laws; electromagnetic waves; antennas and radiation; electromagnetic radiation: solar energy. (Total tuition time: ± 120 hours)

I

INDUSTRIAL PHYSICS IV (IPA107V) 2 X 3-HOUR PAPERS (Module custodian: Department of Physics)

Part A (Paper I): Ventilation - Mechanical ventilation; ventilation networks; heat in mines; refrigeration; dust; compressed air. Part B (Paper II): Renewable Energy - Renewable energy technologies; Solar thermal systems; Solar photovoltaic systems; Concentrating solar power; Wind power plants. (Total tuition time: ± 300 hours)

L

LASER AND FIBRE OPTICS I (LFO107V) 1 X 3-HOUR PAPER (Module custodian: Department of Physics)

Wave Nature of Light; Dielectric Waveguides and Optical Fibres; Semiconductor Science and Light-emitting Diodes; Stimulated Emission Devices Optical Amplifiers and Lasers; Photodetectors and Image Sensors; Polarisation and Modulation of Light; Optical Fibres and Cables; Optical Fibre Connections, Joints Couplers and Isolators. (Total tuition time: ± 240 hours)



O**OCCUPATIONAL RADIATION PROTECTION I (ORP107V)****1 X 3-HOUR PAPER****(Module custodian: Department of Physics)**

Introductory nuclear physics; Dosimetry quantities, units and calculations; Biological effects of ionizing radiation; Principles of radiation protection; International framework and regulatory control; Assessment of internal and external exposure doses; Protection against occupational exposure; Exposure due to practices. (Total tuition time: ± 180 hours)

OPTICAL DESIGN I (OPD107V)**1 X 3-HOUR PAPER****(Module custodian: Department of Physics)**

Foundation of Geometrical Optics; Mirrors and prism systems; Imaging with a thin lens; Gaussian imagery; Object-Image relationships; Paraxial optics; Gaussian reduction; Paraxial raytracing; Stops and pupils; Radiative transfer; Vignetting. (Total tuition time: ± 180 hours)

R**RADIOMETRY AND PHOTOMETRY (RPB117V)****1 X 3-HOUR PAPER****(Module custodian: Department of Physics)**

Fundamental concepts of radiometry; Fundamental concepts of photometry; Black bodies and other sources; Source/receiver flux transfer calculations; Optical properties of materials; Detection of radiation; Radiometers and photometers; Basic concepts of Colour Science. (Total tuition time: ± 120 hours)

RADIATION PROTECTION DOSIMETRY I (RPD107V)**1 X 3-HOUR PAPER****(Module custodian: Department of Physics)**

Radiation-matter interactions; Ionising radiation in biological matter; Radiation detectors; Radiation dosimetry; Counting statistics and measurement uncertainty; Calibration of dosimeters; Non-ionising radiation; Non-ionising radiation protection dosimetry. (Total tuition time: ± 240 hours)

